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Contractors and Engineers Monthly

Vol. 38, No. 11 NOVEMBER, 1941 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Defense Construction**
  Continuing our series of articles on various types of construction for defense, this issue contains three on this important phase of construction, including a description of the concrete paving of the apron and taxiways at the Will Rogers Army Air Base in Oklahoma City; the work on a defense highway in Canada connecting with the Thousand Islands Bridge and therefore of importance to the United States as a joint defense route; and the details of the aggregate plant set up to furnish aggregate, sand and stone for the work at the Naval Air Station at Quonset, R. I.
  See pages 1, 7 and 13.
- **Typical Bridges in Nebraska**
  An example of the type of bridges built by the Nebraska Department of Roads and Irrigation is a 72-foot concrete-deck and wood-pile-bent structure built on Nebraska Highway 15. See page 1.
- **Road Shoulders**
  "A road which carries heavy traffic, whether of military or civil character, is only as good as its shoulders," says George B. Gordon, Public Roads Administration Landscape Architect, in an article on road shoulder development and its place in defense highway work.
  See page 2.
- **Michigan Plant-Mixed Job**
  An 8-mile paving contract, consisting of plant-mixed oil aggregate surface on a plant-mixed stabilized gravel base on a 1-foot stabilized sand cushion to improve a farm-to-market road in Michigan is described in this issue.
  See page 2.
- **Snow Removal in Kansas**
  Kansas' snow removal and ice-control problems and how they are solved are discussed by L. L. Marsh, Engineer of Maintenance, State Highway Commission of Kansas. See page 16.
- **Paving Jersey By-Pass**
  Using a 34-E paver to handle the 9-bag batch, the contractor for a 3.131-mile concrete paving contract in New Jersey completed the job with speed and efficiency, in spite of complications such as the varying widths of approach lanes and ramps. See page 29.

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C. & E. M. Photo
An "off-stage" truck pulled the loaded buggies up the ramp from the mixer to the bridge deck on the Biba bridge contract on Nebraska Highway 15.

Typical Bridges On Nebraska Job

W. A. Biba Engineering Co. Builds 72-Foot Concrete Deck And Wood Pile Bent Structure; One of Seven

(*Photo on page 44*)

✦ DURING the 1941 construction season 9.6 miles of grading, culverts and bridges on a new location of Nebraska Highway 15 was completed between

(*Concluded on page 41*)

Paving Apron and Taxiways At the Will Rogers Air Base

By O. D. HALL

118,585 Square Yards of Concrete Laid in Apron in 28 Working Days by Moran & Buckner

✦ TEN thousand people wandered over the huge 1,600 x 642-foot 8-6-8-inch concrete apron of the $1,750,000 Will Rogers Air Base at Oklahoma City, Okla., during the dedication ceremonies on June 28, 1941. Indians staged a dance on the apron and from a nearby grandstand and control tower, an ambitious program of speeches by high-ranking army officers and civilian authorities was presented and broadcast to the far corners of America.

Few of these people, however, except the contractors and engineers, realized the enormity of the task of laying 118,585 square yards of concrete paving in the face of the most discouraging weather conditions in thirty years. Before the concrete apron and taxiways furnished a smooth hard surface for the storing and anchoring of hundreds of attack, pursuit and bombing planes, the site of the apron and the 121 buildings at the air base was a sea of mud. In some places small lakes and marshlands had to be drained and converted into firm foundations for the street paving, concrete apron and taxiways as well as for the runways on the old municipal airport adjoining the Will Rogers Air Base on the east.

Moran & Buckner, paving contractor of Muskogee and Enid, Okla., started the construction of the apron on March 24 and completed the contract in 28 working days. Due to the unusually frequent rains, the completion date was not until May 29, 1941.

Grading and Drainage

Preliminary grading had been done by the Briscoe Construction Co. of Stillwater, Okla., but Moran & Buckner had some fine grading and drainage operations to complete before laying the concrete. The section of the apron to be paved was brought to within 0.2 foot of the true subgrade, using a 75-hp Allis-Chalmers tractor and an Adams 12-foot blade grader, with one operator for each piece of equipment. Most of the apron was laid on natural grade, with a black clay fill, 2 feet deep in places, at the south end, some of which was taken from the north end. The subgrade was cut to true section with Flynn subgraders, using one operator and two laborers.

No special drainage preparations were necessary as a preliminary to laying the concrete apron, except that the side next to the municipal airport, on the east, was drained by laying standard perforated pipe in a trench filled with gravel and running lengthwise with the proposed apron.

Batching Plant

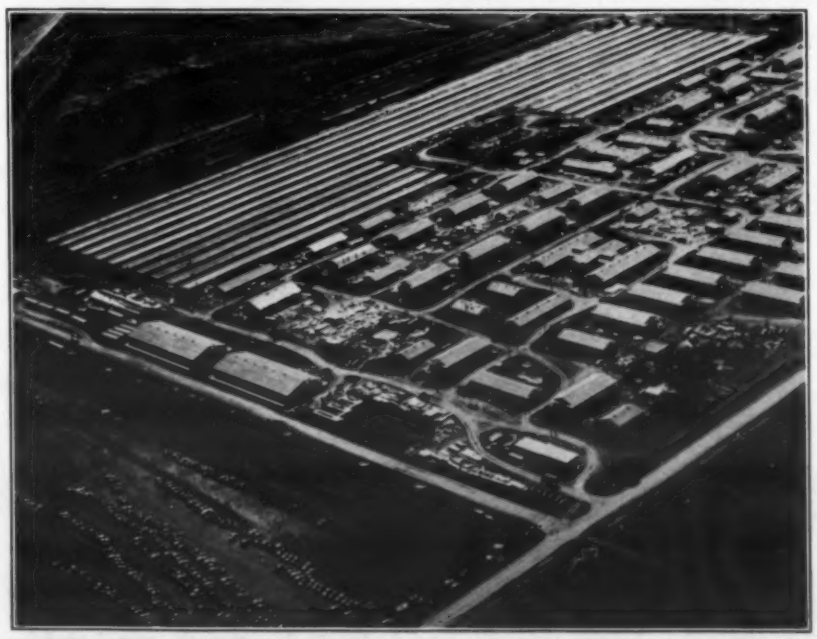
The contractor's batching plant was set up at the railroad spur at Wheatland, Okla., 3 miles from the site of the work. The equipment at the plant included two 1¼-cubic yard Northwest cranes for unloading materials and charging the aggregate bins; two material bins equipped with hoppers and scales for weighing the material and delivering it to trucks; one cement dock and scales, and twenty 2-batch trucks. The labor included two operators and four men on the cranes; two operators at the batchers; fourteen laborers on the cement dock; and twenty truck drivers.

The mix for the concrete was 12.6 per cent cement, 31.5 per cent sand, 49.5 per cent crushed limestone, and 6.4 per cent water. The concrete was tested in the Tulsa Testing Laboratories and was required to have a compressive strength of 3,400 pounds per square inch at the age of 28 days.

Concreting

The concrete apron was laid in 20-foot 8-6-8-inch sections. Each 20-foot wide strip was 6 inches thick in the center to points 3 feet from the edge, from which points it was thickened uniformly to

(*Concluded on page 17*)



Airplane view of Will Rogers Air Base, Oklahoma City, Okla., showing the method of laying alternate 20-foot concrete strips during construction of the concrete apron.

Road Shoulder Development Needed on Defense Highways

Heavily Traveled Roads Are Only As Good As Their Shoulders; How To Improve Them

By GEORGE B. GORDON, Associate Landscape Architect, Public Roads Administration

✦ ACCIDENT records on highways carrying heavy traffic indicate that parking on the traveled way is a major traffic hazard. It is evident that once a vehicle stops forward movement, an adequate road shoulder may be as important for traffic safety and convenience as was the traffic lane itself a moment before when the car was in motion. Now the defense program is increasing traffic on all main highways and particularly on routes leading to cantonments and industrial communities. The danger of parking vehicles on the traveled way in an emergency, because of lack of an adequate shoulder, was ever present under normal traffic conditions. This hazard is now increasing in proportion to increases in traffic. A road which carries heavy traffic, whether of military or civil character, may be considered only as good as its shoulders.

In this article we shall attempt to outline and analyze a few of the basic-design principles which apply to the problem of improving road shoulders on highways in open country. These principles have been evolved by experience in many states where various types of shoulder improvement, including the seeding or sodding of shoulders, has long been a part of regular highway construction, maintenance, and roadside-development work.

From the beginning it has been evident that road shoulder design and treatment are in the main controlled by three basic factors. These are: 1. The kind and density of traffic which is expected to use the road; 2. The character of local topography and of adjacent land use on each highway; 3. The physical texture and character of the soil of which the shoulder is to be constructed.

Traffic

Traffic to be expected on a highway will properly determine the degree of shoulder widening and improvement justified. It may be said that wide all-weather surfaced shoulders become necessary at the point where traffic exceeds about 100 vehicles per hour or 1,000 vehicles per day and that higher average traffic speeds and narrower traffic-lane surfaces increase the need for wider and better shoulders.

For example, with 10-foot traffic lanes used by high-speed mixed traffic, a 10-foot shoulder may be necessary whereas with 11 or 12-foot traffic lanes an 8-foot shoulder may be adequate. Where shoulder slopes are 4 to 1 or flatter an 8-foot shoulder may sometimes be adequate because guard rail will not be required, regardless of the height of fill.

Land Use

The prevailing use of lands adjacent to the highway is also a key to the type of shoulder treatment to be recommended. The great mileage of our eastern open-country highways passes through lands used for agriculture or now reverting from once cultivated fields to pasture, prairie, or wood land. The grasses are the prevailing types of vegetation on most of these highway borders. By working with nature in quickly establishing such grasses we can readily and economically meet the double purpose of improving shoulder traffic service and the appearance of the highway.

Topography and Soils

Highway cross section design is to a great extent controlled by the character of existing topography. As topography becomes hilly or mountainous, traffic speeds tend to decrease with necessary increases in grade and curvature. We therefore would seldom develop on mountain cut sections the wide shoulders which will normally be installed on both cuts and fills in easy low-land topography.

Analysis of existing soil texture and character has been a most important factor in improving road surfaces and subgrades in recent years, particularly on so-called "sand-clay roads". Authorities on this subject have learned to analyze and combine soils ranging between the extremes of loose sand and gravel and dense clays and silts. Soil combinations are prepared by adding a soil binder (usually in the form of silts and clays) to loose sands and gravels, or adding granular-soil materials to unstable silt and clay soils.

Such surface soil-stabilization practices developed on sand-clay roads will be of assistance in improving road shoulders. It is important, however, to consider that where road shoulders are to be covered by a grass sod, improvement of soil texture and structural character alone will not be enough.

Fertility is closely connected with the presence of organic matter in shoulder soils. When combined with good soil texture, fertility will assure good grass growth on shoulders if correct seeding or sodding methods are used. A recent article by Dr. John Monteith on "Management of Park Turf" in *Parks and Recreation* for April, 1941, illustrates this point. Dr. Monteith says in part, "The ideal soil for turf is a sandy loam rich in organic matter". He goes on to state that where it is not practicable to move in a good loam top soil an artificial soil may be prepared "of approximately one-third each of clay soil, sand, and organic matter thoroughly mixed".

Obviously amendment of soils on highway shoulders will frequently be necessary, and the time for this work is during the original construction. From the knowledge already gained in field and laboratory practice by soils engineers road-soil stabilization under unfavorable conditions may be difficult from the standpoint of amending soil textures alone. The added problem on shoulders, of obtaining a soil containing the mixed mineral and organic elements required for good grass sod production,

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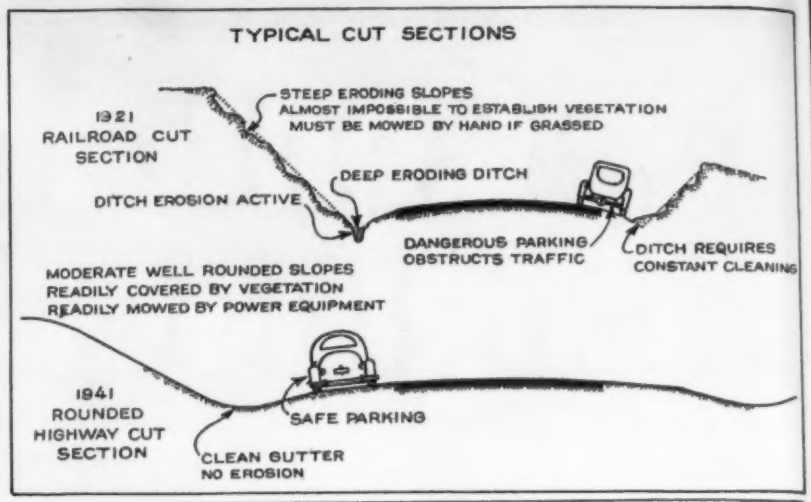
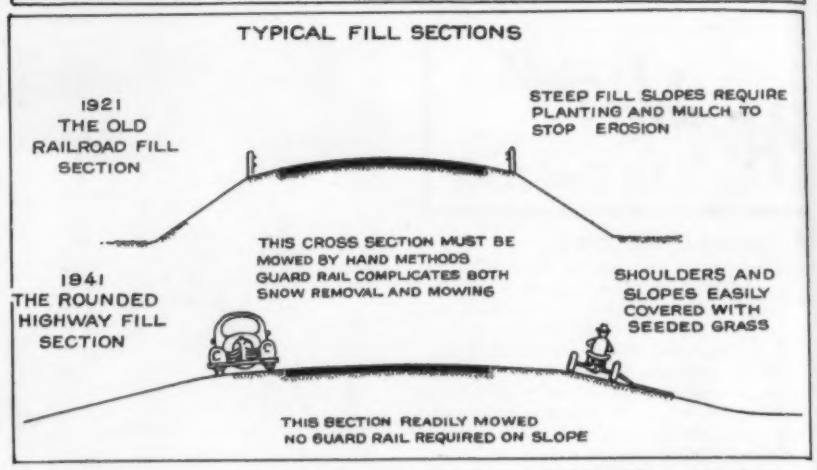




Michigan Plant-Mix On Stabilized Base

Cooke Contracting Co. Laid 8 Miles of Oil Aggregate On Pre-Stabilized Base on Farm-to-Market Highway

✦ AS a connecting link between Lincoln, Michigan, on State Highway 171 and U. S. 23 which runs through Harrisville on Lake Huron, the Michigan State Highway Department built 8.345 miles of oil-aggregate pavement 20 feet wide in June, 1941. The past experience with oil aggregate in Michigan indicates that poor subgrade causes failures; so this section, like all other oil-aggregate paving now being laid, has a plant-mixed stabilized gravel base on a 1-foot stabilized sand cushion. The subgrade operation was done by Louis Garavaglia, of Detroit, Mich.

Base Preparation

The old grade was of clay and suffered from severe frost boils each spring. It was rebuilt, generally raising the grade and improving the sight distance. A 1-foot cushion comprised of an incoherent or gravelly sand was spread and then traffic turned on to compact it while it was maintained with a power grader to fill the ruts. The incoherent sand was stabilized by disking in 2 inches of clay to a depth of 3 inches.

On this prepared cushion a 5-inch layer of plant-mix stabilized gravel was placed in 10-foot strips, leveled, and compacted by a patrol grader. The material selected for the plant-mix was a well-graded crushed gravel aggregate with a maximum of ¾-inch stone and 40 per cent of the mix retained on a 10-mesh screen. To this crushed gravel was added approximately 8 per cent of clay, approximately 8 pounds of calcium chloride per cubic yard, depending on the weather condition, and water to keep the moisture between 6 and 8 per cent. If the weather was unusually dry, a higher amount of chloride was used. As the mix came from the plant, it looked very much like concrete.

As soon as the material was spread and sufficient moisture had left it to permit traffic to use it, the road was opened to traffic and bladed continuously to keep out ruts and to maintain the proper crown. The material usually set up in one or two days of dry weather.

The Oil-Aggregate Mix

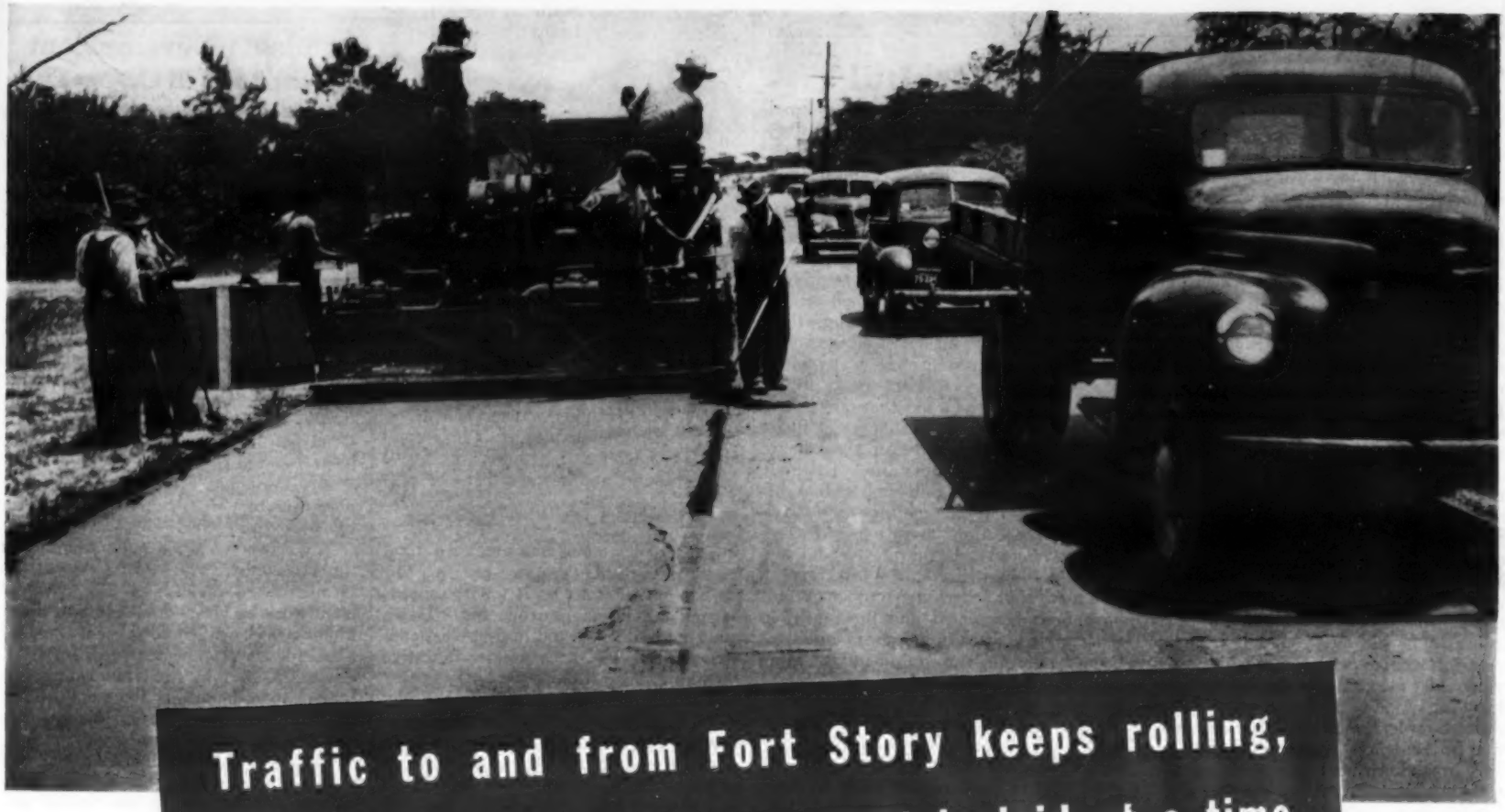
The plant-mixed oil aggregate was made with a gravel aggregate slightly higher in fines than the gravel used for

(Continued on page 24)

Public Roads Administration Photo

Attractive safe shoulders and roadside development on U. S. 90 near Tallahassee, Fla.

The Army's *lines of communication* must be kept open



Traffic to and from Fort Story keeps rolling, as half Texaco Asphalt pavement is laid at a time

In time of national emergency, uninterrupted flow of traffic over the country's highway system is of vital importance. That's especially true of highways leading to Army posts and airports, Naval bases and defense industries.

Traffic should be maintained as near normal as possible even during construction, reconstruction and maintenance of the highways themselves. How successfully that can be accomplished through use of Texaco Asphalt paving is demonstrated by this photograph taken on U. S. Route 60, approaching Fort Story, Virginia.

Note traffic using the completed half of this 5-mile Texaco Asphaltic Concrete project, while construction proceeds on the other half. The two halves of the pavement quickly knit together after construction into a durable, resilient, watertight whole.

Particularly during the national emergency, plan your highway projects so as to cause minimum interference with traffic. Texaco Asphalt paving, laid half at a time, offers an excellent solution.

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CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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THEODORE REED KENDALL.....Editor — O. E. POTTER.....Managing Editor
EDGAR J. BUTTENHEIM.....President — DONALD V. BUTTENHEIM.....General Manager
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This Winter's Equipment Overhaul Is of the Greatest Importance

Almost daily during our mid-summer editorial field trip we heard a contractor or a county highway engineer say, "I'm lucky. I waited only two months for these spare parts." Lucky is right, but it will be more and more difficult to get repair parts for machines as manufacturers' stocks are depleted and they are subjected to increasingly severe quotas which direct that metal must first be used for government defense orders. Even that is difficult to secure from the steel mills on any kind of reasonable schedule.

Just where does this put you in relation to next year's work with this year's equipment? Right behind the eight ball unless you plan the most systematic overhauling and checking of your equipment and power plants at the earliest possible time after the close of the present construction season. The work is going to be slower, you will have increasing trouble getting mechanics, even your older men may be enticed away by the "big wages" at the plants holding defense orders, and in addition there will be the delays in securing new parts.

A breakdown next year will cost you at least twice as much in lost time waiting for parts and in labor expense than it has this year, and you have already had your patience tried to what seems to be the limit. Because of this, an early and thorough overhaul of all your equipment is of the utmost importance. Each of your machines should be taken apart, and each part gone over thoroughly with an eye for worn or weak parts.

The first step in such a check-up should be a good cleaning, for when the accumulated dirt and grease are removed, weakness and wear which may be hiding beneath the dirt show up. There are a number of excellent cleaning solvents for use as a bath or in equipment-cleaning machines and the investment in good scientific cleaning equipment and materials will be well worth while.

When the dirt and grease have been thoroughly removed, you will then be able to tell which parts are worn and need replacement. Orders for new parts should be placed promptly, to allow the maximum amount of time for delivery before you will need them to get into operation next spring. In many cases, worn parts may be rebuilt or reinforced by means of welding, followed by machining. More and more contractors and equipment maintenance men are finding that time and money can be saved through the use of welding in repair and overhaul jobs. And now, with new parts more difficult to secure, it will mean an even greater saving in time and expense to reinforce and build up worn parts to extend their length of service.

Another important item is an especially careful examination of all cable and wire rope on shovels, cranes, draglines, and other equipment, and their protection during the winter season. Replace all broken or worn rope and give special consideration to the use of longer-lived rope of the preformed type. Inactive ropes corrode much more quickly than ropes in use, unless they are properly protected by thorough lubrication. Therefore be sure your wire rope and cable are properly lubricated immediately when they are taken out of service in order to protect them against all elements, to keep them flexible, and to lengthen their life. Failures in wire rope and cable due to lack of proper lubrication, maintenance, and regular inspection may cause severe damage to crane, shovel or paver booms and even loss of life.

When your check-up and overhaul have been completed and the machine reassembled, there is one more point to be considered. The equipment you now have may have to last you much longer than you expected, and it will have to do more work at greater speed than ever before. Therefore every effort to preserve it in good shape is worth while. A good coat of preservative paint to protect it from rust and wear should be the finishing touch. There are a number of special paints particularly designed to protect metal and increase its life, and we heartily recommend that you treat your equipment to some of it. The psychological effect on its operator next spring will be a good one too. If his machine looks new and in first-class condition, there will be a greater incentive for him to keep it that way.

Because of the emphasis on the National Defense effort and the important part which you of the construction industry must play in that effort, there is a premium on particularly thorough maintenance today from which you will reap very definite benefits in the coming construction season. Remember: eternal vigilance is the price of liberty.

The Contract System Protects the Industry As Well As Public

Managing Editor
CONTRACTORS AND ENGINEERS MONTHLY

Thanks for your letter. If available, we can use effectively 125 copies of the reprint of the article "Selling the Public the Contract System".

I take exception to the industry approach to the problem, which I would express as "a belief that public officials can be sold on the efficiency, the economy and the quality of the contract system". The majority of public officials are not interested in these results. They are interested in votes and in impressions which they can create. Ours is a campaign of reiterating historical truths. We must oppose the experimenting public officials, but more particularly we must convince legislators that history is the best teacher, that experience is a wise educator.

Expending public works funds is a tempting morsel for the public official and has been since the erection of the Tower of Babel and the confusion which was created by day-labor methods used in its construction. But legislators uncovered the nefariousness of public officials, of hired employees and sometimes of contractors. As a result, there has been a continuous never-ending public demand for the legislative adoption of safeguards to protect public interests. Witness, if you will, the charters, constitutions, and the laws of cities, towns, counties, and the nation. In order to protect public funds, it has been necessary, by statute, to require public officials, in undertaking public work, to follow sound and well-established pro-

(*Concluded on page* 43)

"Twelve Saturdays at 50c a head—we ought to clean up plenty!"

Roadside Development Awards Will Cover Two Years Instead of One

Because of the necessity of spending all available funds and energies on urgent defense highway construction, we have found a decrease this year in the amount of roadside development work being done. While basic development work should be done at the time a highway is constructed, and this procedure is being followed on all new construction, there are many miles of older roads in this country which need flattened slopes, flattened ditches, and seeding and planting to correct erosion. For the two years for which we have made our Annual Roadside Development Awards, it has been for outstanding contributions on jobs of this latter type that a number of contractors have been nominated for the Awards.

For this reason, we made a survey of the state highway departments to determine how much roadside development work had been done and how many nominations we could expect for the Roadside Development Awards for 1941. From this survey we found that, although there is still as much enthusiasm as ever over the idea of making the Awards, the actual number of nominations would be fewer than last year and would not constitute sufficient competition to warrant making the Section and National Awards this year.

As there is too much interest in them to discontinue the Awards entirely, it has been decided to make our next Awards cover a two-year period instead of one year. State highway departments wishing to make nominations for work done in 1941 may file such nominations through December 31, 1941. These will be held and when the 1942 nominations are received, they will all be judged for the four Section Awards and one National Award for 1941-42.

It should be remembered that all highway contractors having any basic grading or other preparation for future planting as a part of their highway contracts are just as eligible for nomination as those whose contracts contain a major portion of or are devoted exclusively to roadside development work.

With the Awards covering a two-year period, competition for the 1941-42 Awards should be particularly keen, offering a real challenge to all highway contractors to make outstanding contributions to roadside development on their work next year.

Toll Super-Highways

Following much the same pattern as that for the Pennsylvania Turnpike, five states, including Florida, Illinois, Maine, Maryland and New York, have enacted legislation authorizing toll super-highways, the construction and operation of such turnpikes to be financed ultimately through the imposition of tolls upon the highway users.

The Story of Diesel In Interesting Film

The story of Rudolf Diesel's life and work in inventing the diesel engine, and the development of RPM Delo lubricating oil for use in modern diesels, is told interestingly and dramatically in a new film "The Amazing Legacy of Rudolf Diesel" recently made by the Standard Oil Co. of California, producer of RPM Delo diesel-engine lubricating oils.

The film brings out the rapid development of the diesel engine from the heavy cumbersome units of the early days to the modern streamlined engines of today which are providing power in so many spheres of activity, and in none are they serving better than in the construction industry. Because of their wide use in this field, it is important to keep these engines operating at maximum efficiency. And this is dependent upon proper lubrication.

Contractors and state and county highway engineers will find this film about Diesel, both man and type of engine, instructive and interesting. Arrangements for showing it to groups and organizations may be made by writing direct to the Standard Oil Co. of California, 225 Bush St., San Francisco, Calif., and mentioning this magazine.

New Bulletin on Crushers

Bulletin No. A-4, recently released by the Iowa Manufacturing Co., Cedar Rapids, Iowa, describes and illustrates the Cedarapids roller-bearing and plain-bearing jaw crushers. Features, construction details and design are well illustrated, different jaw styles and types are shown, and a chart is included for determining the average percentage expectancy. Specifications for the complete range of sizes from 9 x 12 to 25 x 40-inch are given.

Copies of this 8-page bulletin, printed in two colors, may be obtained by writing direct to the manufacturer.

ROEBLING *Looks Ahead*

TO A SECOND CENTURY OF PIONEERING!

The past—despite its achievement—is *behind*. The opportunity to continue to grow, to further achieve, to serve industry in even greater measure, is *in the future*.

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JOHN A. ROEBLING'S SONS COMPANY
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One of three Heil Trailer Scoops used on a highway contract in Indiana.

Dirt-Moving Scoops On Indiana Road Job

Three Model RS-2T Heil hydraulic Dig-N-Carry Trailer Scoops of 8-yard capacity were used recently by Putnam & Greene, Inc., of Fort Wayne, Ind., on a road-construction project between Walton and Logansport, Ind. On a 2-mile round trip, it is reported that each unit averaged six trips an hour, with a payload capacity on each haul of 6½ to 7 cubic yards.

Based on the performance of these three truck-trailer units on this particular job, output capacities in cubic yards of pay dirt per hour are estimated as ranging from 31 cubic yards for a 6,000-foot one-way haul to 129 cubic yards for a 1,000-foot haul. These estimates are based on road conditions allowing for a high-gear output.

The RS-2T Heil Trailer Scoop is 22½ feet long which added to the length of the hauling tractor allows for a short turning radius for the entire unit. This model has a cutting edge length of 90 inches, taking a maximum depth cut of 6 inches. Its ground clearance in carrying position is 14 inches.

Further information on Heil Trailer Scoops, or other dirt-moving equipment in the Heil line, may be secured by interested contractors and engineers direct from the Heil Co., Milwaukee, Wis., or from this magazine.

New Line of Trucks Provides More Power

The new Dodge Job-Rated trucks recently announced contain new, more powerful engines and numerous improvements contributing to added pulling power, speed, stamina, long life and economy, according to the Dodge Division, Chrysler Corp., Detroit, Mich. The improvements and advancements in the new trucks, it is stated, are intended in every instance to enable the vehicles more adequately to meet the intensive long-range program of heavy-duty service necessitated by the National Defense program.

The complete new line includes 112 standard chassis and body models on 18 different wheelbase lengths, ranging in capacities from the ½-ton pick-up and panel types to heavy-duty gasoline and diesel-powered prime movers. A 115-hp 1½-ton model and 120-hp 1½-ton Special are featured.

The new 6-cylinder high-compression Job-Rated engines retain their established features and, in addition, include such new ones as a by-pass thermostat, water-distributing tube, and full-length water jackets for efficient cooling; a redesigned radiator core with more water cells per square inch on ½-ton models; increases in fan diameter to 18 inches on 1-ton models and to 19 inches on 1½ and 2-ton models; and the addition of a baffle between the radiator shell and top tank on 2-ton models.

The Dodge Dual-Purpose trucks, in 1½, 2 and 3-ton capacities, are equipped with two-speed axles, providing a gear ratio for extra speed with economy and a power ratio for extra pulling ability on hills or in heavy going.

Dodge diesel trucks, available in 152, 170, 188 and 205-inch wheelbase lengths, are all powered by the Dodge designed and built diesel engine which develops 100 hp and 240 foot-pounds torque.

Catalog on Snow Plows For Truck Mounting

The complete line of Baker snow plows for attaching to trucks is described in a new 32-page catalog recently issued by the Baker Manufacturing Co., 585 Stanford Ave., Springfield, Ill. The line includes V-type plows for the complete range of motor truck capacities; sectional tripping blades of various sizes; two types of land-side plows, one a rigid blade with curved land-side and flat runners, and the other a tripping blade model with straight land-side and caster wheels; one-way plows; and accessories such as extension plates for snow plows, light and heavy-duty lift and push frames, and snow plow wings. Included in the V-type plows is a new size, the Model 262, built for attachment to trucks ranging from the heavy-duty 2½-ton up to 3½-ton motor trucks.

Specifications and construction data are given and each plow is illustrated in this catalog, copies of which may be obtained direct from the manufacturer.

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SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE

"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ⅝" cable used:

2-Ton "Lightweight"	75 ft.
5-Ton "General Utility"	250 ft.
15-Ton Triple-Geared "Special"	1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load. Price, f.o.b.

Gear Ratios	Weight	Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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TELSMITH GYRASPHERE CRUSHER

Modern Aggregate Plants ...by TELSMITH

Like hundreds of Telsmith plants all over the world, these new rock crushing and gravel washing plants have operated smoothly, efficiently and profitably right from the start. Most of them are operating on defense work, where the production pressure is tremendous. A Telsmith plant means the latest in equipment—crushers to bin gates—Telsmith-designed-and-built for extra staying power, greater flexibility and capacity, lower operating and upkeep costs. And Telsmith *Balanced* Engineering Service and centralized responsibility fits that plant to your own particular needs. *Write for Bulletin EP-34.*

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Road Work Pushed For Joint Defense

Ontario Dept. of Highways Hastens Completion of Dual Construction on Route 2 Near 1000 Islands Bridge

(*Photo on page* 44)

✦ IT is significant that the progressive province of Ontario is rushing to completion many miles of its fine highway system, including dual highway construction, in spite of its great war effort. Ontario is no nearer in miles to the zone of actual fighting than the United States, but has realized the tremendous demands placed upon highways in the intensified industrial, military-training and possible defense traffic, and has taken action.

One of the Ontario contracts completed in the late summer of 1941, which comes closest in its potential value to military strategy to our own problems, is the 26 miles of dual highway between Gananoque and Brockville, Ontario, included in which distance is the Canadian approach to the Thousand Islands Bridge at Ivy Lea. The hordes of motor tourists from the United States who have crossed the International Border at this point since the bridge was opened by President Roosevelt and McKenzie King, Prime Minister of Canada, have had to reach Ontario Highway 2 by a narrow, winding road which could not possibly carry continuous heavy-weight motor traffic for more than an hour or two. Should the Dominion of Canada be attacked on its eastern borders, it would be a distinct threat to the safety of the United States, and consequently mechanized troops would be hurried to the defense of Canada and our border.

The nearest unit capable of operating in event of such an attack is the Fourth Armored Division, located at Pine Camp near Alexandria Bay, New York, close to the southern end of the Thousand Islands Bridge. This division is comprised of about 15,000 men and 3,500 motor vehicles, and would require 90 miles of highway if it drove in a single line. The bridge offers the only satisfactory crossing for such a train, as it is designed for the standard H20 loading. This mechanized division would have to pass over the 2 miles of winding, narrow roadway mentioned above as the only outlet, and would soon destroy its gravel and 1-inch cold-mix surface. Were it not for the foresight of the Ontario Department of Highways, such an armored division would be useless in the defense of either country.

The Project

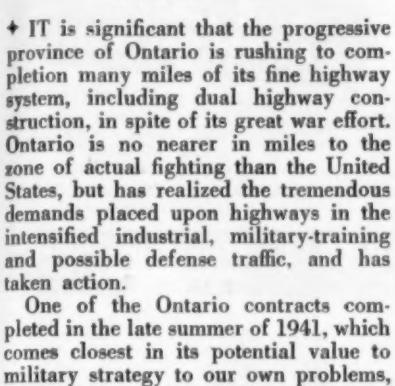
This highway project was started in the spring of 1937 as a 40-foot road from the Thousand Islands Bridge west 8 miles to Gananoque. In 1937 it was doubled in length and width because of the speed of the bridge construction and as a link in the proposed dual highway from Windsor, opposite Detroit, Michigan, through to Montreal, Quebec. The bridge was opened August 18, 1938, and immediately showed the need of a more adequate outlet; but it was the war effort and the possibility of a need for defense by the united troops of two nations that led to the speeding up of the work to completion with a temporary surface in the summer of 1941.

One 18-mile contract was awarded to Campbell Construction Co. of Toronto,

(*Concluded on page* 18)

C. & E. M. Photo

A big bite into the dirt is the contribution of this Austin-Western elevating grader to an Ontario defense highway.



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3½S with Measuring Batch Hopper Mixes 30% to 40% More!

Send today for new catalog and prices.

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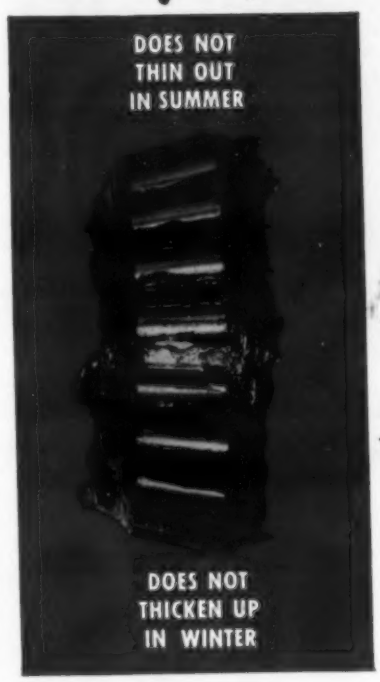
Snap your fingers at Jack Frost



Changing wheel bearing lubricant for seasonal reasons is no longer necessary

THIS FALL, your wheel bearings can face sudden cold snaps with a smile . . . when packed with the sensational new *all-season* lubricant, *Texaco Marfak — Heavy Duty*.

In the lowest sub-zero winter cold, *Texaco Marfak — Heavy Duty* will not cause excessive drag or fail to lubricate. In sweltering summer heat, it stays IN the bearings and OFF the brakes.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred also on many of the larger construction jobs everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

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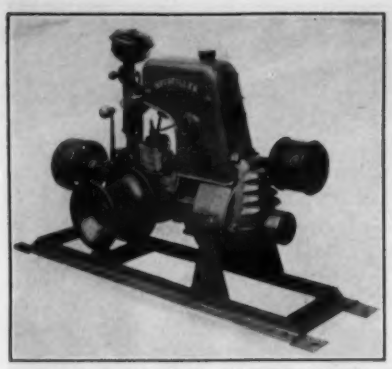
Tune in FRED ALLEN every Wednesday night. See your local newspaper for time and station.

TEXACO Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

RETURN METAL DRUMS PROMPTLY . . . thus helping to make present supply meet industry's needs and releasing metal for National Defense.



A new power plant and power winch.

New Power Winches For Variety of Jobs

A new small power plant and power winch, available in two sizes, for a variety of pulling and handling jobs in the construction field, has been announced by Rototiller, Inc., 102nd St. & 9th Ave., Troy, N. Y. The winch in each of these units has two speeds, a high and a low, so that it can be used efficiently to the maximum of its capacity. The capacity of this winch on a straight pull is 3 to 5 tons.

The power plant consists of a 5-hp 2-cycle motor with a Scintilla high-tension magneto. The belt pulley, which has a separate clutch and runs 500 revolutions per minute, can be dismounted and replaced by a direct-connected electric generator or a water pump. All gears and shafting are of alloyed steel, with the exception of the worm wheel which is of special SAE worm-gear bronze.

Further information on this new power plant and winch and on its many uses may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

35,000 Markers for Pennsylvania Roads

A contract for 35,000 Cataphote reflecting markers to outline the highways of Pennsylvania was recently awarded to the Western Cataphote Corp., Toledo, Ohio. Other orders for highway reflector buttons have also been received by this company from the state highway departments of Oregon, Michigan, Missouri, and Ohio.

The demand for reflectorized traffic signs is increasing in all parts of the country, it is reported, due to the high degree of day and night effectiveness which they afford without the expense of electrical illumination. Western Cataphote also states that this type of guide to traffic continues to serve even in black-outs, as the reflector returns light in the direction of its source only and can not be seen by airplanes or others not in the path of the light. These reflectors also pick up the blue light produced by approved safety lights for vehicles traveling through black-out areas and thus can aid in reducing traffic accidents under the adverse conditions of modern war.

Steel Square Usage In Wood Form Work

The "Steel Square Pocket Book", recently issued in its Sixth Edition by Scientific Book Corp., 15 East 26th St., New York City, is the most practical and reliable reference guide that any progressive carpenter can find. It contains fourteen chapters on laying out all kinds of carpenter work, and will be found to be especially helpful in laying out intricate form work for concrete operations.

The book, which contains 176 pages of text and illustrations and 7 pages of helpful index, sells for $1.00, and copies may be obtained direct from the publisher or through CONTRACTORS AND ENGINEERS MONTHLY.

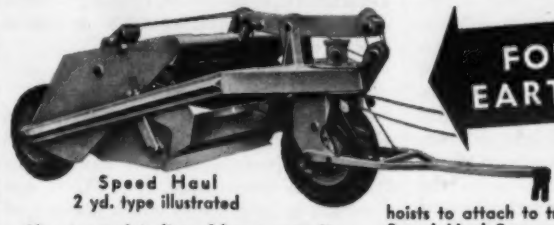
Added Power, Safety Feature 1942 Fords

A wide choice of power and greater safety and comfort for the driver are features of the 1942 line of Ford trucks, according to a recent announcement by the Ford Motor Co., Dearborn, Mich. Four engines, one new and three with added power, cover a range of 40 to 100 hp and provide a motor for every type of trucking job, it is stated. Because of the important defense role which trucks are playing, the new Fords are the most durable units in the company's history, Ford engineers state.

The addition of the new 90-hp 6-cylinder engine to the line increases to 126 the number of chassis and body combinations now available in Ford trucks and commercial cars. A choice of three motors for the heavy-duty units is now provided. Besides the six, two V-8's, one of 90 hp and the other of 100 hp, are available for heavier and faster going. There are also three choices of engine for the lighter units: the six, the 90-hp V-8, and a 40-hp 4-cylinder economy motor.

Structural design which increases the strength and durability of the cab and the new two-piece seat construction are designed to increase the safety and comfort of the driver. The instrument panels have the gages and speedometer grouped in front of the driver for easy reading. On all regular and cab-over-engine units the speedometer is the Shiftoguide type which indicates when to shift gears for greatest pulling ability and maximum economy.

On the cab-over-engine trucks, a heavily insulated engine cover keeps the motor heat and sound out of the cab. It consists of inner and outer steel shells with rock wool compressed between them. For engine accessibility, the sides or the complete cover are quickly removable.



FOR *Low Cost* EARTH MOVING

Speed Haul
2 yd. type illustrated

Also a complete line of large capacity hauling scrapers to 15 cubic yards.

The Speed Haul Scraper is a complete hauling scraper in itself. No pumps or hoists to attach to tractor. Just hitch to the Speed Haul Scraper and go to work. Four sizes: 1, 1½, 2, and 3 cubic yard capacities.

THE SLUSSER McLEAN SCRAPER CO.
SIDNEY, OHIO
Builders of Earth Moving Equipment Since 1880

21 POINTS OF PROFIT
IN LORAIN-80 DESIGN AND CONSTRUCTION

TURNTABLE
1. Double Center Drive pinion which —2. Applies power directly—fully concentrated on any one operation— 3. Or spreads power for high-speed simultaneous operations.
4. Two-piece swing drums designed to take the punishment of the hardest worked part of the shovel.
5. Crowd clutch, extra wide to deliver full digging power, mounted on roller bearings; two-piece, easily reversed bands.
6. Generous underneath clearances.
7. Centralized lubrication.
8. Wider treads.

CRAWLER
1. Center "Chain" Drive.
2. Two speeds either direction.
3. Steers either direction.
4. Safety travel and tread lock.
5. Mechanism runs in oil bath.

SHOVEL BOOM
1. All-welded (strength; all-steel; torsion-resisting).
2. All-steel dipper stick.
3. Door stops to protect stick.
4. Automatic power dipper trip.
5. Automatic crowd brake to hold stick extended.

CRANES, CLAMS, DRAGS
1. Simultaneous hoist, swing and travel (or boom derricking).
2. High-speed boom hoist—power and precision control of boom derricking and lowering.
3. "Cable-Miser" fairlead with interlocking, geared sheaves.

THEW CENTER DRIVE

It's the speed with which a shovel gets material *into* and *out of* the dipper that determines your profits. The true worth of the Lorain-80's 21 design features is best proved by the fact that when faced with tough, big yardage rock jobs, such as the one above, scores of contractors turn to this machine for profit protection. And that means just one thing—the Lorain-80 has proved to their satisfaction its ability to *move more material, faster, at lower cost,* regardless of the digging.

Write for design and performance data on the Lorain-80, today. You'll find it talks your kind of language—*yardage and profits.*

THE THEW SHOVEL COMPANY
LORAIN, OHIO

1 3/4 YD. LORAIN-80

Tubular Shank Shovels

The new Razor-Back tubular-shank hand shovels and spades made by the Union Fork & Hoe Co., Columbus, Ohio, are described and illustrated in Form No. R11 recently issued by that company. Because of the backbone of these shovels, forged in one piece with a 60 per cent thicker center, for the full length from cutting edge to the upper part of the socket, it is stated that they will withstand unusually severe service. Other features of these shovels include their balanced construction, one-piece heat-treated blade and socket, the new longer tubular shank, and the rugged handles protected against weather and bugs.

Copies of the literature describing the types and construction of Razor-Back shovels may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Conveyor Belting Repair

A new tool for the maintenance of conveyor belting in the field, the Type RO patch vulcanizer, has been added to its line of vulcanizers by the B. F. Goodrich Co., Akron, Ohio. Designed for repairing the covers of conveyor belting, this vulcanizer is round in shape, 10 inches in diameter, and of the single heated platen type. It clamps against a steel plate 12 inches in diameter held against the opposite sides of the belt.

A new catalog section, 2159, describes and illustrates this tool, and points out the need for such equipment to permit the speedy repair of minor cuts and gouges in a belt's rubber cover which, if disregarded, might allow the entry of moisture and abrasive material into the fabric plies, tending to weaken them. Copies of this catalog may be secured by those interested direct from the manufacturer by mentioning this item.

New Waukesha Branch

The Waukesha Motor Co., Waukesha, Wis., manufacturer of heavy-duty internal combustion engines since 1906, has opened a sales office at 414 Joseph Vance Bldg., Seattle, Wash., with A. G. Mulkey as District Manager. Associated with Mr. Mulkey, who has been with Waukesha for the past 20 years, is Paul E. Rabbach, a field service engineer recently transferred from the factory staff at Waukesha.

RAW DESERT

TO FINISHED AIRPORT!

A "Caterpillar" Diesel D8 Tractor with LeTourneau scraper on the Army's air base for advanced training at Litchfield Park, Arizona. 175,000 cubic yards of dirt are being moved in this operation.

This Pioneer crusher, powered by a "Caterpillar" Diesel D13000 Engine, supplies crushed rock for cement runways at the Litchfield Park Field.

Truck roads at the new Air Corps base are maintained by a "Caterpillar" Diesel No. 12 Motor Grader. Barracks in background will house pilots in training.

THE Army Air Corps has to have good flying fields and plenty of them to put through its huge new program of pilot training. One reason why it's been getting them in a hurry is the hard-hitting, load-moving power of "Caterpillar" Diesel equipment.

From the first rough grading right through to the finished runways, "Caterpillar" Diesel Tractors, Engines and Road Machinery handle the job with speed and economy. They're built to *work* and *keep on working*. Down-time is reduced and schedules kept up by the rugged dependability of "Caterpillar" construction. And costs are consistently lowered by the superb "Caterpillar" fuel system that permits the engine to operate cleanly and efficiently on the cheaper grades of fuel.

Meeting America's defense needs is one of the toughest assignments ever tackled by men in the dirt-moving industry and by the manufacturers who supply their tools. But the job will be done. CATERPILLAR TRACTOR CO., Peoria, Illinois.

CATERPILLAR DIESEL

ENGINES AND ELECTRIC SETS · TRACK-TYPE TRACTORS · ROAD MACHINERY

BUILT by CONTRACT
HAVE YOU NOTICED THIS SIGN?
This sign stands for the Best in Construction. You will see it on construction jobs which are being built by the most efficient experts, who have proved their skill, integrity and responsibility, and who had to compete against other experts to secure the contract. So, of course, the sign means
THOROUGH WORKMANSHIP
MAXIMUM SPEED
LOWEST COST
BUILD BY CONTRACT

Reproduction of a circular sent out by the A.G.C. of Missouri.

More Publicity for The Contract System

Carrying on with its share in the campaign to sell the public on the value of construction by contract and thus to preserve this system in the United States, the Associated General Contractors of Missouri recently prepared a circular, illustrated above, which was sent out to all public officials in the state of Missouri, to all Chambers of Commerce, to all newspapers and to all architects and engineers in the state.

In addition, each member and affiliate of the association was given a supply of these circulars and was asked to enclose one in each letter sent out for the ensuing month. The sign to which the circular calls attention is being displayed on 108 jobs in Missouri.

Such publicity is in line with the suggestions made in the symposium "Selling the Public the Contract System" which appeared in the August issue of CONTRACTORS AND ENGINEERS MONTHLY. The Associated General Contractors of Missouri has been very active in this campaign for better and more potent public relations for contractors and for the preservation of the contract system. Similar efforts on the part of contractor groups elsewhere will aid considerably in enlightening the public on the benefits to them of construction of public works by the most efficient and economical means available, in other words, *by contract.*

Highway Research Board Will Meet in Baltimore

Because of the need for conserving Washington facilities for urgent defense activities, the Highway Research Board will change a custom of twenty years' standing and hold its Twenty-First Annual Meeting at Johns Hopkins University, Baltimore, Md., the first week of December, 1941.

On Tuesday, December 2, several Departments of the Board will hold open meetings for the consideration of papers and reports, and sessions of the Board for the discussion of topics relating to highway finance, economics, design, materials, construction, maintenance, traffic and soils investigations will be held on Wednesday, Thursday and Friday, December 3-5.

New Wheel Tractor For Highway Work

The new Toro General Dump Box wheel tractor, recently announced by the Toro Mfg. Co., Minneapolis, Minn., will handle a wide variety of highway work for state and county highway departments or on highway construction jobs. With its 1 or 1½-yard dump box, it can be used for small earth-moving jobs, it will pull light road plows, harrows or cultivators which are being used increasingly in road stabilization work, it will pull road drags or gang mowers, and sickle bars or light snow plows can be mounted on it.

The General is substantially built with 4-inch steel channels and spring-mounted axles front and rear. It is powered by a Ford engine with four-speed transmission providing a speed range up to 31 miles an hour, or for high-speed hauling only, optional without reduction gear, with a speed range up to 60 miles an hour. Its gasoline tank has a capacity of 7 gallons, and a tool box for small tools is mounted under the leather upholstered bus-type seat.

The dump box is an all-steel electrically welded box of 1-yard capacity which can be furnished with extensions to provide a capacity of 1½ yards. A simple positive locking latch and spring snubbers permit the load to be dumped clean.

The General has a front-wheel tread width of 57 inches, a rear-wheel tread width of 59 inches, and is equipped with 6.00 x 16 tractor-type tires in front and 7.50 x 16 tires in the rear.

Further information on the new Toro General tractor and its many uses may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

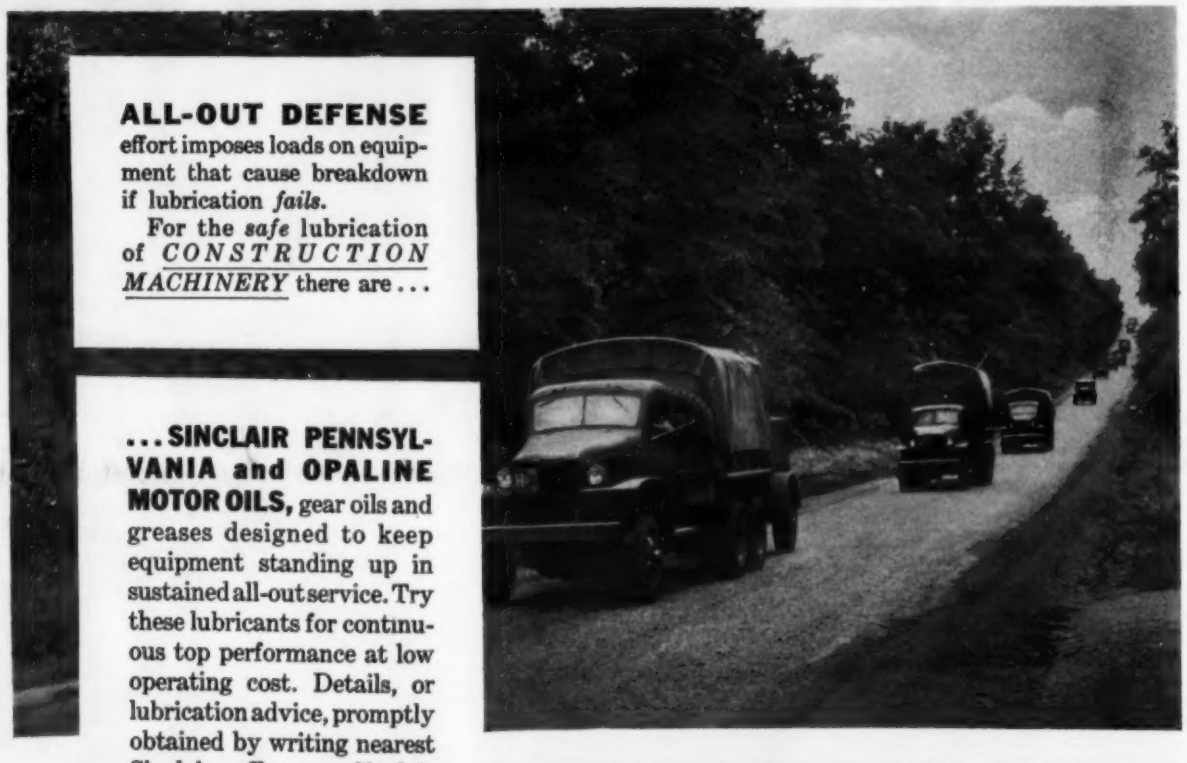
Soil Stabilization for Defense Roads, Runways

To meet the requirements of military and civil authorities for information on the use of calcium chloride in the construction of defense highways and airport runways, the Calcium Chloride Association recently published a new bulletin, No. 26, entitled, "Soil-Aggregate Stabilization and the Use of Calcium Chloride for Military Roads and Airport Runways." The booklet is designed to cover the fundamental phases of dust laying, surface consolidation and base stabilization. As examples of actual experiences, construction details are given on projects at an Army Airport and at a munitions plant. The use of calcium chloride in concrete work for military purposes is also discussed briefly.

Interested contractors and state and county highway engineers, or other officials, may obtain copies of this bulletin by writing direct to the Calcium Chloride Association, 4145 Penobscot Bldg., Detroit, Michigan.

This full capacity, industrial ½" Drill is handier, more powerful and an all-around better drill than many costing a third more. Specially wound high torque forced-air-cooled motor. Improved "natural grip" end and breastplate handle applies thrust directly behind drill point—and all quality features: oilless bearings, streamlined die cast case, etc., etc.

SPEEDWAY MFG. CO., 1849 S. 52nd Ave., Cicero, Ill.

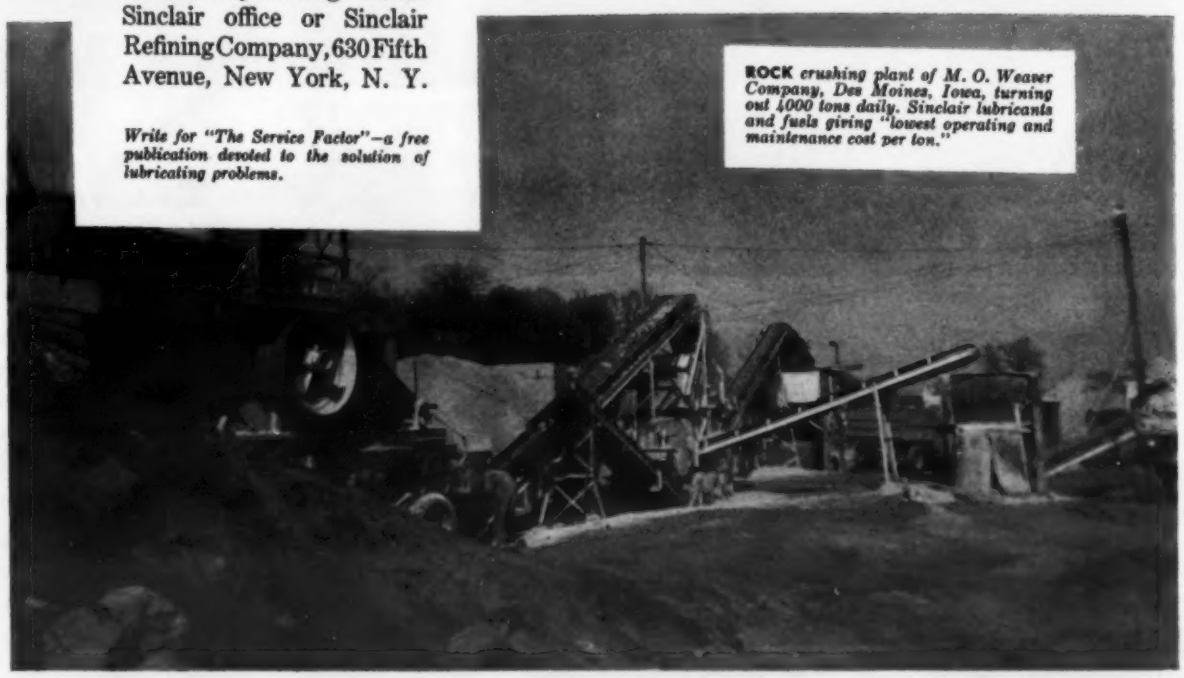


ALL-OUT DEFENSE effort imposes loads on equipment that cause breakdown if lubrication *fails.*

For the *safe* lubrication of *CONSTRUCTION MACHINERY* there are . . .

. . . SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS, gear oils and greases designed to keep equipment standing up in sustained all-out service. Try these lubricants for continuous top performance at low operating cost. Details, or lubrication advice, promptly obtained by writing nearest Sinclair office or Sinclair Refining Company, 630 Fifth Avenue, New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



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SINCLAIR REFINING COMPANY (Inc.)

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New Forest Highway In Los Angeles County

A 25-Mile Route Through Angeles Forest Completed This Year; Erosion and Slides a Problem

By OWEN H. BARNHILL

+ THE Angeles Forest Highway, the 25-mile oil-penetration route recently completed by the Los Angeles, Calif., County Road Department across the Sierra Madre Mountains north of Pasadena, is an example of modern county road construction at low cost under difficult conditions. Most of the right-of-way is over steep and rocky terrain where there is no other road for miles. The route crosses Big Tujunga Canyon, a gorge 185 feet deep and 435 feet wide, on a concrete arch bridge, the contract for which was awarded to Person & Hollingsworth of Los Angeles for $115,390. (C. & E. M., Oct., 1941, page 26.) All other work on the highway was done by county forces, with the hand labor performed by prisoners.

This new highway, which is the only paved route across the Sierra Madre Mountains between Fremont Pass, 25 miles to the west, and El Cajon Pass, 35 miles to the east, passes through the picturesque Angeles Forest, and provides not only a scenic tourist route but will also be of great value to fire wardens in protecting an important part of Los Angeles' watershed.

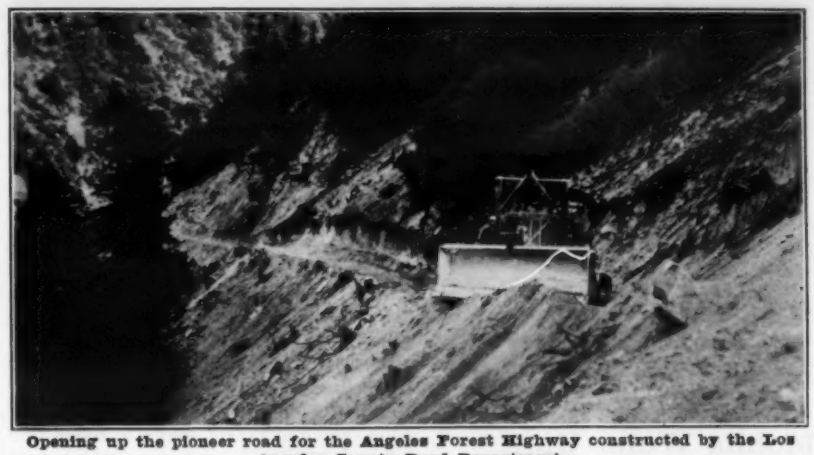
Starting at Switzer's Saddle, which divides the Arroyo Seco and Big Tujunga watersheds, 10 miles north of Pasadena, one crew of county highway workers extended the road 7 miles northward to the Big Tujunga River, while another crew began working at Vincent, located on the Sierra state highway near Palmdale, on an 18-mile stretch southward to Big Tujunga bridge.

Grading

This cross-mountain highway was built by cutting the roadway into the mountain side and using the excavated material for fills across gorges. A pioneer road was first opened around the head of draws and over ridges, and then as the excavation approached the grade the adjacent fills were brought up to elevation. Overcasting would have buried the shrubbery needed to protect the slopes from erosion, and in places have filled in water courses below. In order to insure a reasonably straight highway, it was necessary to build the road in the manner described instead of following a contour around all gorges.

The county highway organization first cleared the right-of-way of trees and brush, and followed this immediately with a Caterpillar and Angledozer which cut out the pioneer road so that the power shovel could start heavy excavation, loading to dump trucks. Ledge rock was drilled with jackhammers, powered with 210-cubic foot to 315-cubic foot air compressors and shot with 5, 20, 40 and 60 per cent dynamite.

A feature of this work was the absence of the usual spreading and rolling operations aided by watering. The road across gorges was filled by dumping in the loose material and then building the finished highway on top of it without waiting for settlement. Settling and slides in fills have been practically nonexistent, as the material is almost entirely solid granite or other hard rock and disintegrated granite. The fills are drained by the larger-size stones at the bottom of the fill, such rocks reaching the bottom first when dumped from the cut at either side and permitted to roll into place.



Opening up the pioneer road for the Angeles Forest Highway constructed by the Los Angeles County Road Department.

Problems: Erosion and Slides

A major problem in the construction of this highway was the protection of cut and fill slopes from erosion. Although the climate here is semi-arid, precipitation sometimes is sudden and excessive. During the disastrous flood of March, 1938, 14 inches of rain fell on the Big

(*Continued on page 38*)

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company

32-36 Dey Street
New York, N.Y.

Hayward Buckets

78° HI-DUMP HOIST

By

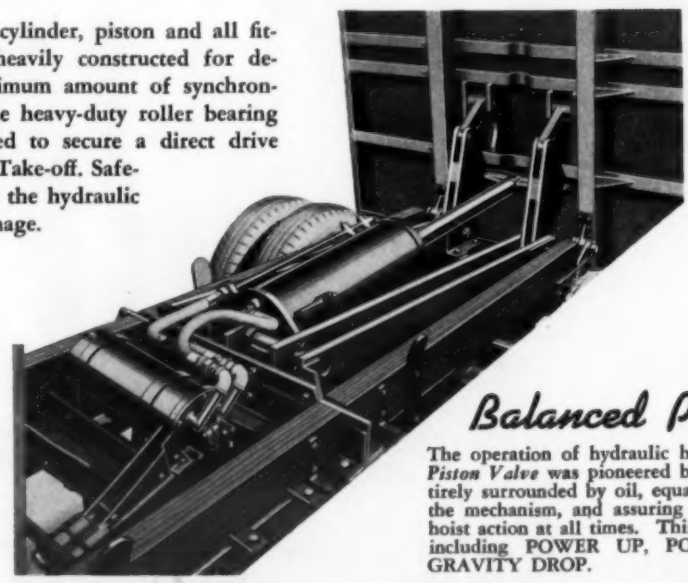
HERCULES

10" CYLINDER
MODEL 10XG HOIST

★HEAVY-DUTY EQUIPMENT FOR THE TRANSPORTATION OF SUCH MATERIAL AS SLAG, CLAY, BLACK LOAM, ROCK ★

The extreme dumping angle of 78° to 80° assures removal of all material from the dump body and scow end. Body and hoist are under complete control in any position. The Model 10XG Hoist is one of the most powerful hoist mechanisms manufactured by Hercules, exerting brute strength with a smooth, easy action.

Hoist lift arms, cylinder, piston and all fittings are very heavily constructed for delivery of a maximum amount of synchronized power. The heavy-duty roller bearing pump is designed to secure a direct drive from the Power Take-off. Safety valves protect the hydraulic system from damage.



POWER UP
POWER DOWN

ONE CAB LEVER CONTROLS ALL OPERATING POSITIONS

Balanced Piston Valve

The operation of hydraulic hoists by means of a *Balanced Piston Valve* was pioneered by Hercules. This valve is entirely surrounded by oil, equalizing pressure on all sides of the mechanism, and assuring complete, easy control of the hoist action at all times. This is a four-position mechanism, including POWER UP, POWER DOWN, HOLD and GRAVITY DROP.

You can't beat Hercules Heavy-Duty Hoists and Dump Bodies for steady, economical service. There's a Hercules for every type of work. Contact your nearest Distributor or write for details.

HERCULES STEEL PRODUCTS

GALION, OHIO

The Universal mobile water tank.

Mobile Water Unit Modern Gungha Din

One of the last places to relinquish the community drinking cup has been the construction job, on many of which the water boy still carries an open pail and dipper. Realizing the hazard to public health in having large groups of men drink water in this admittedly unsanitary manner, the authorities on defense construction projects have required that sanitary arrangements for the drinking water used by workers on the job be provided.

To solve this problem and at the same time provide a mobile unit which could be taken around by the water boy, the Universal Paper Products Co., 823 So. Wabash Ave., Chicago, Ill., has developed the Universal mobile water unit. This outfit consists of a 5-gallon tank with a standard cooler faucet, on one side of which is mounted the all-metal dispenser for paper cups and on the other the waste cup receptacle. It is equipped with a harness and is carried on the back of the water boy. Six sizes and styles of cups are available, but the No. 6 VeeCup with a capacity of 7 ounces is the one most favored for use on construction jobs as it serves a man-sized drink of water. A large open mouth at the top of the tank permits quick filling and easy and thorough cleaning. A standard jacket, made of canvas with hairfelt insulation has been developed to keep the tank cool in the summer and protect the water against cold in the winter.

Literature describing this Universal mobile water tank unit may be secured by those interested direct from the manufacturer by mentioning this item or from this magazine.

Precision Control of Batches for Concrete

The Scientific Concrete (SC)2 patented method of control of concrete production is claimed to provide a quick and accurate method of determining the amount of moisture in the aggregates; an automatic method of correcting for the moisture already in the aggregates; an automatic graphic record showing the delivered weight of every ingredient in every batch; and precision weighing of all concrete ingredients, with electric cut-off to insure just the proper amount. In this procedure, a patented Toledo moisture meter scale is used to determine the amount of moisture carried by the sand and gravel, and it is stated that this determination can be made in less than a minute.

A new catalog entitled "Are You Mixing Too Many $ in Your Concrete" has recently been issued, explaining and illustrating this procedure for precision control of the concrete mix, the equipment for which is installed on the job on a rental-fee basis. Interested contractors and engineers may secure copies of this new catalog direct from the Scientific Concrete Service Corp., McLachlen Bldg., Washington, D. C., by mentioning this magazine.

Drills for Soil Testing

A new bulletin, describing and illustrating the Parmanco vertical drill for use in soil testing for roads or bridges, for digging post holes up to 10 inches in diameter, and similar service has recently been issued by the Paris Mfg. Co., Inc., Paris, Ill. This vertical drill, which is powered by a 16-hp Wisconsin motor, is available as a trailer, or with a lazy wheel, so that it can be towed by an automobile. It is stated that it will drill from 3 to 6-inch holes to any reasonable depth.

Copies of this bulletin No. 104 may be secured by interested contractors and state and county highway departments direct from the manufacturer by referring to this item.

New Bulletin Describes Small Convertible Shovel

A very low center of gravity and a single line pull on the hoist drum of 10,000 pounds, together with a positive powerful chain crowd, give the Badger shovel the power and stability to handle any diggable material with speed at low cost, according to the manufacturer, The Austin-Western Road Machinery Company, Aurora, Ill. The Badger is constructed of strong light-weight steels, equipped with anti-friction bearings, and is of ¾-swing design. This means that only the turntable and boom move; consequently with this lighter swinging weight, less power is needed. It is equipped with a ½-yard bucket, is easily converted to clamshell, crane, dragline, pile driver, trench hoe or skimmer. and is available equipped with gasoline, diesel or electric power.

Copies of a new catalog describing and illustrating the Badger may be obtained by writing direct to the manufacturer, and mentioning this item.

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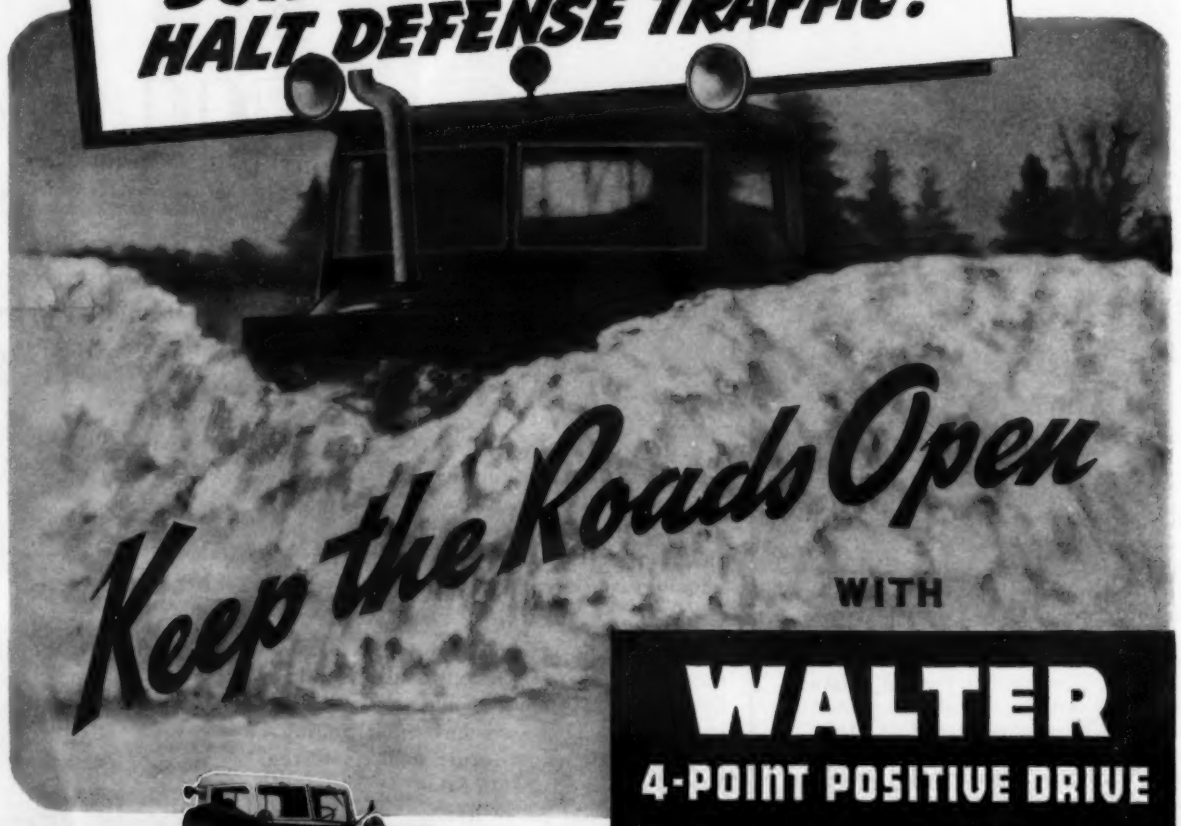

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Equip with WALTER SNOW FIGHTERS and be ready for ANY conditions. Walter 4-Point Positive Drive will keep you moving through high drifts, over heavy, hard-packed snow or icy surfaces, without stalling or slipping. There never was greater need for WALTER SNOW FIGHTERS in your department than this Winter of national emergency. Write today for literature.

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New Aggregate Plant Supplies Naval Base

Crushing, Screening and Washing Plant Operated by Boston Sand & Gravel Co. Produce Any Stone Sizes

(*Photos on page 44*)

✦ THE requirements for sand and crushed gravel at the Naval Air Station, Quonset, R. I., were so great that a new complete aggregate production plant was built by the Boston Sand & Gravel Co. of Cambridge, Mass., on the Frenchtown Road in East Greenwich, R. I., about 6 miles distant from the base. During the life of the original contract, the plant produced over 400,000 cubic yards of aggregates to meet the rigid specifications for Navy 1-inch and 2-inch concrete aggregate, sand, and ½-inch stone for asphaltic-concrete paving mixtures.

The Pit

A pit somewhat over 9 acres in extent was thoroughly stripped of vegetation and top soil and then the pit-run sand and gravel was excavated with a 1¼-yard Lorain shovel with an Amsco bucket loading to three shuttle trucks. These trucks tail-dumped over a feeding hopper covered with a welded grizzly consisting of railroad rails, transversely, and old axles, longitudinally, giving 12 x 14-inch openings. Two men at the grizzly dumped the trucks and kept the grizzly clear, using crow bars to push oversized stone over the side.

Primary and Secondary Crushing

The material in the feeding hopper was fed uniformly by a 30-inch x 5-foot 6-inch Telsmith plate feeder driven by a 5-hp motor and V-belt drive of the gears and eccentric. This feeder discharged onto the main feed belt, an Anderson steel truss frame belt conveyor 30 inches wide and 133 feet 1 inch between centers. The belt was driven by a 20-hp Continental drip-proof motor through two roller chain reductions operated in oil. This main feed belt discharged to a No. 450 Telsmith rotary grizzly with 4-inch openings between the rings so that minus 3¾-inch material passed through. The grizzly was driven by a 5-hp Continental gear motor through a chain drive.

The oversize from the rotary grizzly went to an 18 x 30 Telsmith-Wheeling jaw crusher, direct-driven by V-belts from a 60-hp Continental motor. The material passing through the grizzly went directly to a 5 x 10-foot Telsmith single-deck, and at times double-deck, vibrating screen driven by a 7½-hp totally enclosed fan-cooled Continental motor. This screen made separations at times to produce Navy 1-inch gravel and at other times Navy 2-inch gravel. In either case the oversize was delivered to a No. 36 Telsmith Gyrasphere secondary crusher for final crushing. The discharge from both the primary jaw crusher and the secondary gyratory crusher was delivered to a 24-inch belt on an 87-foot 6-inch Anderson steel truss frame and driven by a Western Electric 10-hp motor. This belt carried the material up and back in the direction of the feeder and discharged onto a 3 x 8-foot Telsmith vibrating screen to remove all crusher dust from the stone. Material passing this screen was returned to the main feeder belt so that it could again go through the rotary grizzly and vibrating scalping screen and thus provided a closed circuit.

Producing ½-Inch Stone

Material passing the 5 x 10-foot Telsmith double-deck screen was ready for further processing. The lower half of the lower deck of this screen discharged into a second 36-inch Gyrasphere fine crusher set to reduce the stone to ½-inch. The discharge was taken by a bucket elevator and raised to a 4 x 10-foot Telsmith double-deck vibrating screen, the oversize being returned to the fine crusher and the finished product from the bottom deck being delivered unwashed to a 50-ton steel bin. This was the material prepared especially for hot-mix asphalt paving of roads and runways at the Naval Air Station.

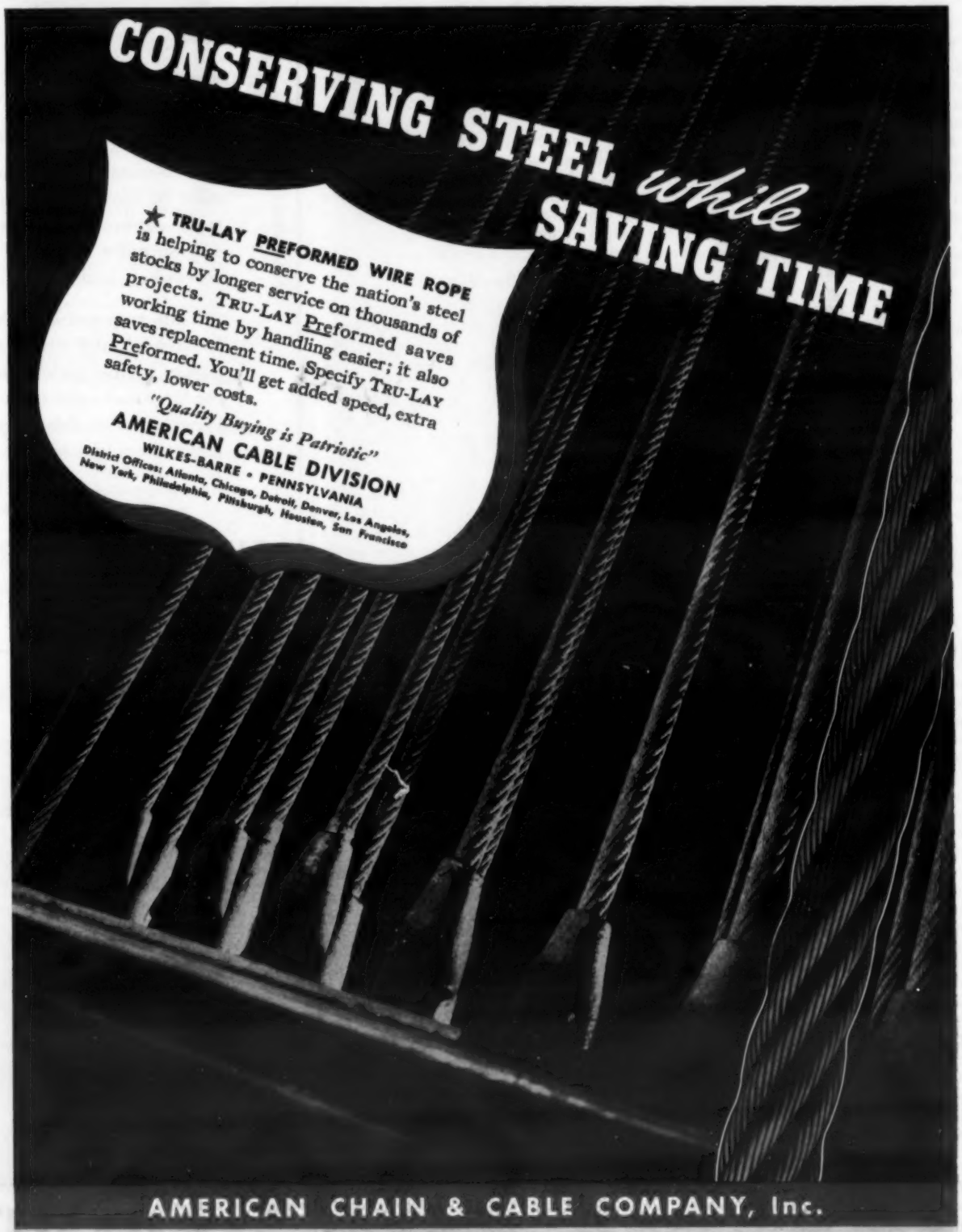
C. & E. M. Photo

Loading a shuttle truck in the 9-acre pit at the aggregate plant which furnished aggregate, sand and stone for the Naval Air Station at Quonset.

Washing Plant

The material passing the top half of the 5 x 10-foot vibrating screen fell onto a 24-inch belt 135½ feet long, known as the main finished product belt, which conveyed sand and both crushed and

(*Concluded on page 32*)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Seeding and Sodding On Highway Shoulders

(*Continued from page 2*)

requires still further technical analysis by the landscape engineer in cooperation with soils engineers.

Right-of-Way

A current report by one of the Committees of the Highway Research Board emphasizes that "one of the most urgent needs is the adoption by the states of a long-time policy of acquiring and financing right-of-way on a carefully-laid-out system of heavily traveled highways". It is evident that an adequate highway cross section which will include an 8 to 10-foot shoulder must be predicated on adequate right-of-way taking. No attempt should be made to widen shoulders without also regrading and widening the gutter and slopes beyond the shoulder.

Adequate Road Shoulder

Within the controls set up by traffic, topography and soil and climatic conditions, an adequate shoulder will meet the following general design requirements.[1]

1. Under average easy topographic conditions, on roads carrying more than 100 vehicles per hour, an adequate shoulder will be 8 to 10 feet in width. In very rough topography a lesser width may be satisfactory in cut sections if the full shoulder width is provided wherever possible on sections of fill.

2. A well-designed shoulder should be suitable for use under all weather conditions. Essential design provisions to meet this requirement will generally include:

(a) A well-drained subgrade and adequate surface drainage.

(b) A soil composed of proper mixture of sand, gravel, cinders, or equivalent granular particles with dense clayey or silty soils, plus loam or equivalent organic matter if a grass sod cover is to be installed.

(c) An adequate surface of gravel, bituminous materials or of seeded or sodded grass.

Shoulder Drainage

Adequate surface drainage depends largely upon a pitch or slope of shoulder adapted to the surfacing materials used. The smoother and harder the surface, the less pitch will be required. Thus a rough gravel or grass-covered shoulder will usually require a pitch of 1 inch per foot, where a bituminous shoulder surface of ½-inch pitch per foot may be satisfactory. Grass shoulders have a tendency to rise in height with reference to the pavement edge, particularly when inadequate in pitch, thus interfering with drainage of surface water. This tendency can be controlled either by finish-grading earth shoulders to be grassed to a point about ½-inch below the pavement surface, or by spring rolling with a light power-driven roller after sod has been established. Subsurface drainage of the shoulder will seldom be required if shoulders are constructed of a proper mixture of sandy, clayey and loamy soils. Under heavy clay or clay loam shoulder soil conditions, selected porous material used under the surfaced traffic lanes, however, may well be carried under the shoulder also.

Surfacing Shoulders

Certain states (notably Connecticut) have developed a smooth well-kept shoulder by the use of light road oils bladed into existing sandy shoulder soils. An equivalent stabilization of dusty earth shoulders has also been accomplished by the use of calcium chloride, under fairly humid climatic conditions, and such industrial by-products as lignin waste from paper manufacture. Except possibly under very heavy clay, shale, or rocky soil conditions, however, where sandy gravel, loam, or equivalent materials necessary for soil amendment prior to seeding are not locally available, *a shoulder surface of tough dwarf drought-resistant grass sod* has been found most economical and effective on the average open country highway.

[1]See page 4. "A Policy on Highway Types (Geometrie)" issued by the American Association of State Highway Officials. 1940.

Advantage of Grass Shoulders

A shoulder covered with grass sod has the following advantages over all other types of surfaced shoulders:

1. The grass-covered shoulder sharply contrasts in color and texture with the surfaced traffic lanes. This is of special advantage in night driving.

2. The shoulder covered with well-selected dense dwarf grass sod once established becomes more and more effective with the passage of time. Bituminous materials or calcium chloride, for example, used in surfacing shoulders, must be renewed at periodic intervals and the shoulder rebladed and reshaped.

3. The grass shoulder, except under the most unfavorable soil conditions, tends to renew itself if damaged by temporary traffic use. No other type of shoulder surface has this "self-healing" quality.

4. Average original costs of grassed shoulders, and maintenance costs of grass sod after securing a shoulder cover, are lower than those for any other types of shoulder-surface protection as reported by most of the state highway departments in humid regions.

Seeding

Grass-seed mixtures should be selected to meet local soil, shade, and moisture conditions. See the accompanying table for some grass-seed mixtures recommended for trial on road shoulders in regions where the grasses listed have been successfully grown. The grasses here listed have the special sod-forming qualities desirable for road shoulder cover.

The following rough outline of seeding operations should be adapted to local soil and site conditions. *Supervision of seeding operations by a well-trained landscape personnel is usually the difference between success and failure.*

1. Pulverize prepared shoulder soil by raking or harrowing to 3 to 5-inch depth.

2. Unless good loam is available, add 20 to 40 pounds of 10-6-4 fertilizer per 1,000 square feet of shoulder surface, plus peat moss, bone meal or equivalent organic matter as required by the soil analysis.

3. Sow seed by rotary or wheelbarrow seeder if available, preferably during days when there is no high wind.

4. Cover seed lightly with brush harrow or rake.

5. Roll with roller weighing not more than 15-25 pounds per foot of roller.

As a rule, the best seeding season east

(*Concluded on next page*)

Defense Materials and Supplies **MUST NOT BE DELAYED**

Highways Must Be Kept Open

The National Emergency means men and materials *must* be moved . . . snow blocked highways, slowed traffic cannot be tolerated now! Trucks, troops, military supplies must find open roads this winter . . . everywhere and at all hours.

Your responsibility this winter is more than local. Your roads and streets are no longer yours alone but part of a great national network that must be ready for the large and sudden demands of the National Defense Program. For this huge job only the best in snow removal equipment will do.

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BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE - 1900 **LITTLEFORD**

LITTLEFORD BROS.
485 E. Pearl Street, Cincinnati, Ohio

Good Road Shoulders Essential to Good Roads

(*Continued from preceding page*)

of the prairie region is between late August and early October. Spring seeding east of the prairie regions should begin as early as the ground can be tilled. In southern latitudes winter seeding may be successful and the end of the spring seeding season may be April first or even earlier, depending on local climatic conditions.

Maintaining Sodded Shoulders

Many of our troubles with grass-covered shoulders originate from lack of understanding of the basic requirements for healthy grass growth. Authorities on turf growing generally agree on the following principles:

(1) *Fertilizing.* For quick establishment of a grass turf, as well as in maintenance after establishment, a complete commercial 10-6-4 fertilizer is of great value under average shoulder conditions. Sewage sludge, bone meal, cotton seed meal, and similar organic fertilizers are safer and more lasting in their effects on turf than the more concentrated inorganic fertilizers, but are bulkier and less easy to handle.

Top dressing of established turf with a complete fertilizer is particularly recommended during the growing season in autumn and early spring.

(2) *Mowing.* In spring and fall when growing actively, grass turf may be mowed close to the ground. Close mowing after permitting grass to grow tall should be avoided. Under average conditions setting the mower at a height of at least 2 to 3 inches is recommended. Grass clippings, unless so heavy as to smother out grass, should be left on the road shoulder. Frequent mowing during seasons when grass makes rapid growth will permit leaving clippings on the shoulder and avoid the added cost of removing them.

When Not to Plant Grass

We have attempted to outline briefly some of the most usual advantages of grass-covered shoulders and the general principles and methods of turf culture involved in establishing them. No discussion of road-shoulder treatment can be complete, however, without briefly considering those conditions which more or less prohibit the use of grass shoulders.

(1) Under very heavy mixed high-speed traffic conditions, when traffic tends continually to crowd the shoulder because of narrow 10-foot traffic lanes, for example, black-top surfaced or gravel shoulders may be necessary. In some instances a coarse-textured bituminous surfacing 1 to 2 feet wide between the traffic lane and the sodded portion of the shoulder has been successful.

(2) Under arid or semi-arid climatic conditions, even in irrigated districts, grass shoulders may well be "out".

(3) Where, because of very rough topography or other conditions, road shoulders on cut sections cannot be widened to 8 or 10 feet, a gravel or "black top" shoulder is indicated.

Some Suggested Grasses for Use on Road Shoulders

Note: Local changes in soil, altitude, and shade conditions may require change in seed formulas—Analysis of local grass species always desirable.

Region	Grass	Per Cent Seed By Weight	Remarks
New England	Colonial bent	10	Increase fescue seed on sandy soils—and in shade
New York	Chewing's fescue	30	
North Pacific Coast	Red top	30	
	Kentucky blue grass	30	
Lake States	Kentucky blue grass	20	Increase blue grasses on clay type soils—fescue on sands
West to Dakotas	Canada blue grass	20	
	Chewing's fescue	30	
	Red top	30	
Middle West	Kentucky blue grass	50	Increase Kentucky blue grass on loamy soils — Canada blue grass on poor clays
Middle Atlantic South to Carolinas	Canada blue grass	25	
	Red top	25	
Carolinas South to Texas. Lower Mississippi Valley	Use mulch sod or stolons of native low sod forming grasses, such as Bermuda grass, carpet grass, Centipede grass, St. Augustine grass, etc., locally available.		
Northern Prairie Regions	Seed crested wheat grass (Fairway Strain) or western wheat grass. Use stolons or sods of buffalo grass and other native low sod forming grasses.		
Southern Prairie and Southwest	Seed western wheat grass. Use stolons or sod of buffalo grass where available.		

(4) Where shoulders must be constructed of heavy hard-pan types of clay soils; and sand, hard coal cinders, sandy gravel, or equivalent granular materials are not available to amend such "tight" soil, grass shoulders may be out of the question.

Conclusion

The answers to the problems of obtaining shoulders on our new highways with adequate width, a firm smooth surface in all weather, and a good grass sod cover *begin with original right-of-way, highway design, and construction.* On a well-designed shoulder with a selected soil wherein sand, clay, and loam plus necessary fertilizers are properly combined we know that satisfactory meadow turf has been grown. But even under the most favorable conditions we still have much to learn regarding the use of living vegetation on bare highway areas. The most essential ingredient for successful turf production on shoulders or other portions of the highway will always be cooperation in all stages of highway construction between qualified landscape and highway engineers and the contractor who does the work.

Delaware Aqueduct

An interesting pictorial folder on the Delaware Aqueduct, the world's longest tunnel, and the part played by Gulf lubricants in its construction has recently been issued by the Gulf Oil Corp. The urgency of this gigantic project, which will increase New York City's water supply by 540 mgd, is indicated by the fact that in 1939 New York City exceeded its safe yield by 36 mgd. Therefore contractors, impressed at the start by the emergency nature of this job, are doing everything possible to complete it ahead of schedule and many records have been broken on the project.

In any emergency job, it is important to keep equipment functioning at maximum efficiency and to avoid breakdowns and stoppage of work. The Gulf Oil Corp. points out in this folder that no matter what type of equipment you are operating, Gulf Periodic Consultation Service on proper lubrication will help.

For copies of this interesting folder "Delaware Aqueduct" and further information on Gulf lubricants and Gulf lubrication service, write direct to the Gulf Oil Corp., Gulf Bldg., Pittsburgh, Penna., mentioning this item.

Catalog on Hoists and Bodies for Six Wheelers

A new bulletin recently released by Gar Wood Industries, Inc., Hoist & Body Div., Detroit, Michigan, is devoted to its complete line of hoists and bodies for 6-wheel chassis. Various types of hoists and bodies, including light, medium and heavy-duty models, built for particular hauling requirements, are illustrated, and brief descriptive data are given for each.

Copies of this bulletin, No. 8, may be obtained by writing direct to the manufacturer and mentioning this item.

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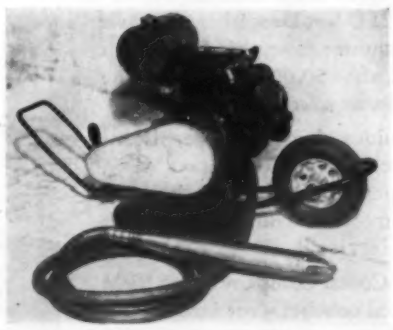

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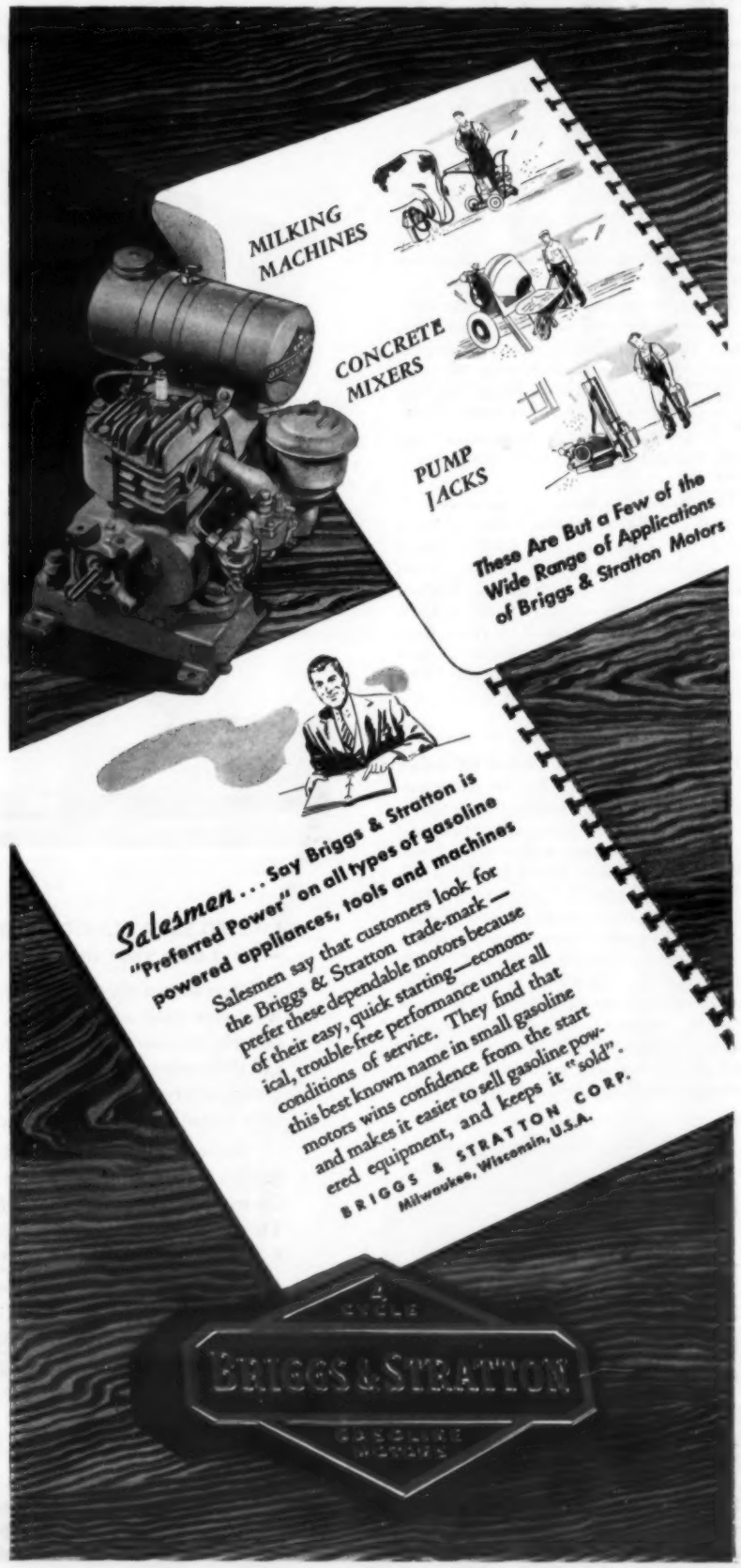
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Snow and Ice Control On Kansas Highways

Careful Planning, With Specially Designed Plows, Abrasives, and Snow Fence Keep Traffic Moving

By L. L. MARSH, Engineer of Maintenance, State Highway Commission of Kansas

(*Photo on page 44*)

✦ KANSAS, riding the 40th parallel of latitude in the geographic center of the United States, has two kinds of winters, "Snow" and "No Snow". A glance at the snow and ice-control costs of the State Highway Commission indicates readily which year was which, since careful records have been kept.

From July 1, 1929, to June 30, 1930, for example, the cost was $239,142.91; but for the 1934-1935 period, it was only $96,320.08. Yet for the twelve months ending June 30, 1940, the cost was $336,258.22, an all-time high. No two snow storms are identical in wind velocity or wind direction, or in moisture content of fallen snow. Prevailing winds during a Kansas storm are from the north, northwest or west. Snow fence is placed, therefore, on the north and west sides of cuts requiring protection from drifts. But wind and temperature changes during storms often cause reversal of snow-removal procedure.

Today, the public demands open highways, regardless of weather conditions. These bring problems not experienced prior to 1931. Strategic placing of snow fence, high-speed plows with adjustable-angle moldboards, and distinctive lighting facilities for snow-removal equipment worked at night have been developed.

The State Highway Commission of Kansas maintained 9,592 miles of State and Federal highways in 1940. There are six highway divisions, with headquarters at Topeka, Salina, Norton, Chanute, Hutchinson and Garden City. Each division is divided further into four or five maintenance districts, each in charge of a District Supervisor, with a total of twenty-seven such districts.

Snow Fence

By October 15, most of the 480 miles of snow fence owned by the Commission was in place, protecting the stretches of highways which previous experience has indicated as vulnerable. The fence will be removed and stored by April 15.

Since the Highway Commission does not pay rent for installing snow fence on privately owned land, there are many points where permission can not be obtained for its erection. Consequently, drift protection is not provided by fence in such instances. Most landowners, however, cooperate with the Commission, since all are highway users at some time. In return, the Highway Commission does not install fence until the landowner has completed fall plowing or seeding, and will remove certain fences earlier than April 15 upon request. All broken posts, braces and wire are carefully removed from the land.

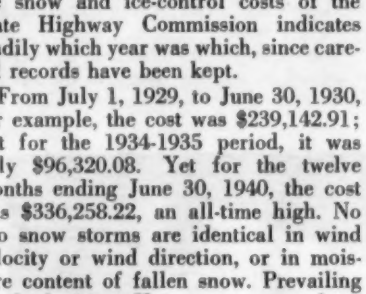
Standard snow fence consists of 4-foot 1½-inch wooden slats spaced at 4 inches and bound by five double strands of galvanized wire. The general rule of 15 times the height of fence from the nearest right-of-way line is used in placing. The rule is varied, of course, depending upon the terrain. Five 6½-foot steel posts, weighing 1.3 pounds per foot, are used for each single 50-foot roll. The 4-inch spacing between slats is almost as effective as the 2-inch spacing and reduces wind resistance appreciably, thereby decreasing the number of broken posts each winter. The cost of erecting, removing and storing snow fence averages approximately 2 cents per foot per year.

The widening wing for motor grader or truck used by the Kansas Highway Commission.

Snow Removal Equipment

The Maintenance Department owns 205 V-type truck snow plows, 109 one-way truck plows and 42 V-type tractor and motor grader plows. It has no rotary-type plows. Three years ago it became apparent that there was need for an adjustable-angle one-way plow. By that, we do not mean a trip blade or trip moldboard, but a plow on which the discharge angle could be changed from 25 to 45 degrees. W. H. Jury, Superintendent of Equipment, working with

(*Continued on page 26*)



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LIKE TO SEE A CLEAN ENGINE—free rings, perfect bearings—next time your Diesel equipment is due for inspection?

Then take a tip from Washington Motor Coach Company, who put their new coaches, powered with General Motors Diesels, into service with RPM DELO last December. On their grueling runs, these coaches encounter every kind of tough going, every type of weather. Yet, after 50,000 miles each, the only attention the motors needed was a *look!*

"Valve stems were free in the guides, rings were free, pistons and all crankshaft bearings in excellent condition," says W. W. Churchill, Superintendent of Operations and Maintenance. These coaches have now traveled more than 80,000 miles each and still give "highly satisfactory service"!

No wonder Washington Motor Coach Company chose RPM DELO again when seven additional coaches went into service this year! And no wonder we say—use RPM DELO in *your* Diesel equipment—*regardless of make, size or type.* SEE how it lowers maintenance costs, boosts operating profits!

ORDER RPM DELO
Unequaled
FOR YOUR DIESELS

Approved by the makers of over 95% of the installed Diesel horsepower in America, RPM DELO is marketed under the following names:

RPM DELO
Kyso RPM DELO
Sohio RPM DELO
Signal RPM DELO
Caltex RPM DELO
Imperial-RPM DELO
CONCENTRATE

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your locality.

RPM DELO

STANDARD OIL COMPANY OF CALIFORNIA

Concrete Paving for New Army Air Base

(*Continued from page* 1)

8 inches at the edge. Similar methods were used in the construction of the taxiways which are 100 feet wide and 300 feet long.

Expansion joints were placed in the apron every 100 feet, with longitudinal keyed joints in the middle of each 20-foot slab to permit expansion. Dowel bars, 2 feet 6 inches, center to center of every slab, were placed 20 feet apart. Anchor rings for the airplanes to be parked on the apron were placed 20 feet center to center each way beginning 5 feet from the joints.

The batches for the concrete were delivered to the pavers, the water added, and the concrete mixed 1½ minutes. As soon as the paver had delivered the concrete to the subgrade, it was screeded and tamped by Jaeger-Lakewood finishing machines. The 27-E MultiFoote paver mixed 29.7 cubic feet of concrete per batch, and the 34-E MultiFoote delivered 37.4 cubic feet, with one operator each. Final finishing and belting was done by hand.

Wet burlap was used for the initial curing and as soon as the concrete was set, the burlap was removed and the surface sprayed with asphalt emulsion at the rate of 0.1 gallon per square yard.

The result of these carefully engineered and executed operations is a solid and substantial apron capable of holding up under the heaviest of army or navy aircraft. The apron will not be used for the taking off or landing of airplanes, as sufficient runway capacity will be furnished by the old Oklahoma City municipal airport, adjoining on the east, which has been leased to the U. S. Army for operation as a single unit with the Will Rogers Air Base.

Street Paving

The graveled streets at the Air Base were put in by the T. L. James Co., general contractor for construction at the field. They were paved with crushed stone and asphalt, this work consisting of two applications of MC-1 asphalt primer and AC-4 binder for stone screenings. Four inches of crushed stone was shoveled in by hand, properly rolled and compacted, and bound with asphalt primer. Then 2 inches of stone screenings were rolled into the binder material.

The total area of streets thus paved was 36,033 square yards. The streets are from 20 to 25 feet wide between curb lines, and the paving was laid on a subgrade scarified and compacted in accordance with standard methods. The paving is designed to hold up under the ordinary traffic conditions which are likely to be encountered at the Air Base.

Personnel

The plans and specifications for the concrete apron, taxiways and street paving at the Will Rogers Air Base in Oklahoma City, Okla., were prepared and the work supervised by Major H. A. Montgomery, District Engineer, U. S. Engineer Department, Tulsa, Okla. The same office prepared the plans and specifications for all other construction at the Air Base.

For the general contractor, the T. L. James Co., E. D. Piatt was General Manager, Samuel Johnson, Project Manager, and J. C. Love, Assistant Project Manager. Moran & Buckner, of Muskogee and Enid, Okla., who had the contract for the concrete paving of the apron and taxiways, was represented on the job by L. K. Moran and J. I. Buckner. In addition, their organization included John S. Lykes, Superintendent; one assistant, one paymaster, four foremen, 30 skilled laborers, 20 truck drivers, and 90 semi-skilled and unskilled laborers.

PREPARE NOW FOR WINTER AND SPRING CONSTRUCTION

Use the Time-Saving Parts and Service Facilities of LeTourneau-"Caterpillar" Distributors to Keep Your Equipment Operating at Peak Efficiency

THERE will be no winter letup on defense construction. You can help the defense program and yourself by keeping your old equipment operating at peak efficiency, moving big yardages steadily. To aid you, LeTourneau-"Caterpillar" dealers maintain parts stocks unequalled in the tractor equipment industry. Their factory trained servicemen will gladly help you with your overhaul problems. Let your nearest LeTourneau-"Caterpillar" dealer help you prepare NOW for winter and spring construction work. He's listed below.

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State Tractor & Equipment Co., Phoenix, Buckeye, Coolidge, Mesa.
ARKANSAS
J. A. Riggs Tractor Co., Little Rock, West Memphis.
CALIFORNIA
Bergland Tractor & Equipment Co., Napa, Dixon, Rio Vista, Santa Rosa.
Brizard Tractor & Equipment Co., Arcata.
Budd & Quinn, Inc., Fresno, Madera.
Cornell Tractor Co., Salinas, Watsonville, King City.
Cousins Tractor Company, The, Hanford, Bakersfield, Corcoran, Wasco.
Halton-Treanor, Inc., Visalia, Porterville, Tulare.
Holt Brothers, Stockton, Lodi.
Ben Hulse Tractor & Equip. Co., El Centro, Brawley.
Johnson Tractor Company, Riverside, Coachella, Ontario, Colton.
Marysville Tractor & Equip. Co., Marysville, Roseville.
Joseph G. Moore Company, Santa Maria, Paso Robles, Goleta, Lompoc.
Peterson Tractor & Equipment Company, Hayward, San Francisco, Brentwood.
Rye Tractor & Equipment Company, San Jose, Hollister.
San Diego Tractor & Equipment Company, San Diego, Escondido.
Shepherd Tractor & Equipment Company, Los Angeles, Oxnard, Pomona, Santa Ana.
Sierra Tractor & Equipment Company, Chico, Gridley, Redding, Red Bluff.
Valley Tractor & Equipment Company, Modesto, Los Banos, Merced.
Weaver Tractor Company, Sacramento, Woodland.
I. G. Zumwalt Company, Colusa, Willows.
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Clinton & Held Company, Denver.
CONNECTICUT
The Nicoll-Talcott Corporation, Hartford.
FLORIDA
Burgman Tractor & Equipment Co., Jacksonville.
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Yancey Brothers, Inc., Atlanta.
Yancey Tractor Company, Albany.
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Bunting Tractor Company, Inc., Boise, Twin Falls.
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Indiana Equipment Company, Inc., Indianapolis.
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Gibbs-Cook Tr. & Equip. Co., Des Moines, Mason City.
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Miller-Hasselbalch Company, Sioux City.
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Karcher-Wolter-Foley Company, Wichita.
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Eastern Tractor & Equipment Co., South Portland.
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P. L. Perkins Company, Boston
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Brebner-Sinz Machinery Company, Inc., Marquette.
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Taylor Tractor Company, Inc., The, Columbus.
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Southwest Machinery Company, Oklahoma City, Tulsa.
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Braden-Bell Tractor & Equipment Co., Pendleton, Athena, Heppner, Arlington.
Bunting Tractor Company, Inc., La Grande.
Interstate Tr. & Equip. Co., Portland, The Dalles, Eugene, Marshfield.
Reed Tractor & Equipment Company, Klamath Falls.
PENNSYLVANIA
Beckwith Machinery Company, Pittsburgh, Bradford, Harrisburg, Wilkes-Barre.
Giles & Ransome, Philadelphia.
SOUTH CAROLINA
Jeff Hunt Road Mach. Co., Columbia, Moncks Corner.
SOUTH DAKOTA
Western Material Company, Sioux Falls, Aberdeen, Rapid City.
TENNESSEE
R. L. Harris, Inc., Knoxville, Chattanooga.
McCarthy, Jones & Woodard Company, Inc., Nashville.
Taylor-Hale Machinery Company, Memphis.
TEXAS
R. B. George Machinery Company, Dallas, Amarillo, Abilene, Tyler, Lubbock.
Gulf Tractor & Equipment Company, Houston.
Wm. K. Holt Machinery Company, San Antonio, Weslaco, Corpus Christi.
Tri-State Equipment Co., El Paso.
UTAH
Landes Tractor & Equipment Company, Salt Lake City.
VIRGINIA
Virginia Tractor Company, Inc., Richmond, Roanoke.
WASHINGTON
Braden-Bell Tractor & Equipment Company, Walla Walla.
Hofius-Ferris Equipment Company, Spokane.
Northern Commercial Company, Seattle.
Webb Tractor & Equipment Company, Yakima, Wenatchee, Connell, Waterville, Ellensburgh, Mason City.
Western Tractor & Equipment Company, Seattle.
WEST VIRGINIA
West Virginia Tractor & Equipment Co., Inc., Charleston, Clarksburg.
WISCONSIN
Brebner-Sinz Machinery Company, Inc., Green Bay.
Nagle-Hart Tractor & Equipment Company, Madison, Milwaukee, Eau Claire, Superior.
WYOMING
Wortham Machinery Company, Inc., Cheyenne, Sheridan, Greybull.
ALASKA
Northern Commercial Company, Fairbanks, Anchorage, Nome.
HAWAII
Theo. H. Davies & Co., Ltd., Honolulu, Hilo, T.H.

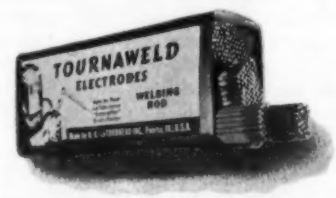
Replace Worn Cables with Tournarope

Tournarope, a 6x19 filler wire, right lay, lang lay wire rope with an independent wire rope center and an identifying galvanized core strand, is manufactured by LeTourneau especially for cable-operated tractor-drawn equipment.

For the past year all LeTourneau equipment shipped from the factory has been equipped with this new, specially made wire rope. As a result, Tournarope has been thoroughly tested by hard usage and is now used as standard on the country's biggest and toughest earth-moving jobs

Made in 5 Sizes

Tournarope comes in the following sizes: ⅜" ½", ⅝", ¾" and ⅞". It is easy to order—all you have to do is specify the size and number of feet wanted. No worrying about type or lay.

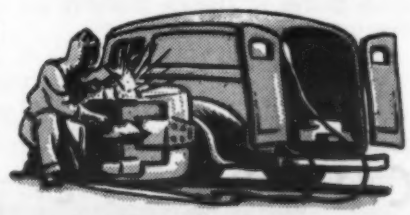


For Making Stout Welds Quickly, Use Tournaweld

To help you make repairs in the field, Tournaweld electrodes are now available from your LeTourneau-"Caterpillar" dealer. Tournaweld electrodes have been thoroughly proved by almost two years of use in LeTourneau plants. During that time LeTourneau has used more than 4,000,000 pounds of Tournaweld, found it far superior to any other available rod for the welding of mild steels and the special analysis steels used in the manufacture of LeTourneau products.

Order from your LeTourneau-"Caterpillar" distributor.

Many LeTourneau-"Caterpillar" dealers are equipped with Tournacar welders to give factory repair service right on your own job.



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Joint Defense Highway Rushed to Completion

(*Continued from page 7*)

involving moving 893,000 cubic yards of rock and 500,000 cubic yards of earth. A second contract, 8 miles in length, east of the original contract, was awarded to Standard Paving Co. of Toronto. This second section involved 300,000 cubic yards of rock and 200,000 cubic yards of earth, and is complete except for the paving, but has a temporary gravel surface.

Rock and Earth Grading

On the Campbell contract, rock was removed from deep cuts and ledges by drilling with units of Gardner-Denver jackhammers supplied with air by a 447-cubic foot Sullivan compressor powered by a Caterpillar diesel engine. Maximum 22-foot steel was used for drilling in cuts up to 35 feet high, using toe holes at the base to lift the rock. No wagon drills were used on the work, and there were no detachable bits employed. The stone was a tough granite which wore down a bit for each 6 inches of hole. After drilling and cleaning, the holes were loaded with 50 per cent dynamite which works admirably on this type of rock. Power from Kohler 1,500 and 2,000-watt portable electric plants was used for detonating the electric caps for blasting.

Earth excavation was handled by an elevating grader and also by shovels. For the final top dressing of the rock grades west of the Thousand Islands Bridge, Campbell used an Austin-Western elevating grader with a 48-inch belt driven by an International engine. The outfit was pulled by a Caterpillar RD8 tractor, and required only about 12 seconds to load a truck. A maximum of 60 trucks was used on a 2-mile haul from one borrow pit, and an average of 26 trucks was employed on a 1¼-mile haul, with which as much as 3,000 yards of dirt were excavated and delivered to the grade in a 10-hour day. Most of the trucks were hired locally, but the contractor used a few of his own in the fleet to maintain the pace.

Temporary Surfacing

Because of the great war effort of the entire Dominion of Canada and the tremendous contribution made to this by the Province of Ontario, the portions of the dual highway which have been completed have been surfaced temporarily with 1,000 tons of gravel per mile, and the surface maintained in a dustless condition by the application of 1½ pounds of calcium chloride per square yard of traveled way. With careful maintenance this has proved an adequate highway for all of the traffic, and because of the large area of traveled way offered by the dual highway has furnished adequate transportation facilities for moving any conceivable volume of mechanized traffic from the Thousand Islands Bridge to Ontario Highway 2 either east or west of the bridge.

The Finished Highway

When funds again become available for the established concrete paving program, this section of Route 2 and all other sections completed will receive concrete paving 23 feet wide on either side of the central 30-foot boulevard strip. The right-of-way taken for the dual highway has been 150 feet, with 96 feet of grade shoulder to shoulder. Careful planting along the center of the boulevard strip will serve as a protection against accidents and the potential hazard of glaring headlights, while flat rounded slopes on both sides of the ditch will eliminate the necessity for guard-rail installation.

Personnel

The Gananoque-to-Brockville section of dual highway on Ontario Highway 2 is being built by the Campbell Construction Co., of Toronto, Ontario, of which R. H. Campbell is Vice President and Secretary and Alex Bonser is Superintendent. The Hon. T. B. McQuesten is Minister of Highways for the Province of Ontario, and R. M. Smith, Deputy Minister.

FOUR *Ransome* PAVERS

Leaving the Ransome Plant

All in a Single Day!

Conclusive proof of widespread approval is this photograph of four Ransome Pavers leaving for points from Quebec to British West Indies.

Where there's such a demand there's a reason. For proved performance make yours a Ransome.

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THERE'S EXTRA PERFORMANCE IN EVERY ATTACHMENT

WITH ALL-WHEEL DRIVE and STEER

The extra power and maneuverability of the "99-M" enables the operator to broadblade and bulldoze at the same time.

Scarifying tough black top. Alloy teeth are removable and adjustable. The scarifying unit folds up to give unusual throat room.

The "99-M" Loader Attachment strips sod from high shoulders and loads excess dirt windrowed from ditches; leaves ground smooth and firm with proper slope for drainage—saving from one-half to two-thirds of the usual loading time. Handy for use between forms and invaluable for shallow excavation, or for small excavating jobs.

This new hydraulically controlled Roller makes the "99-M" a most effective finishing machine. It rolls out wheel marks as it compresses material. Two 3-foot sections, overall width, 8 feet.

Fitted with A-W Snow Wing and the Giant V-Plow, measuring more than 12 feet wide overall, this "99-M" pierced through drifts to astonish its owners . . . plowed up ice formations 8 to 15 inches thick.

***When You Go for a Demonstration* YOU'LL GO FOR THE "99-M"**

THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill.

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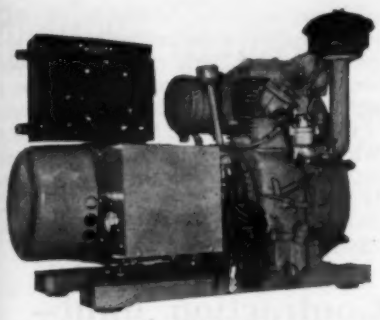

One of the new Kato power plants.

New Series of Plants For Light and Power

A new series of light and power plants, including the 600-watt Model 14A, 1,000-watt Model 26A, the 28A of 1,500 watts and Model 30A of 2,000 watts, has recently been announced by the Kato Engineering Co., 4 Elm St., Mankato, Minn. Available with remote or fully automatic control, these plants furnish 110-volt 60-cycle alternating current or a good source of direct current at a usable voltage.

The generators are of the self-excited single-phase type, with double-sealed ball bearings, and are bolted directly to the engine crankcase. Power is furnished by a Briggs & Stratton 4-cycle single-cylinder air-cooled engine, with a specially designed float-feed type adjustable carburetor, an adjustable fully enclosed mechanical-type governor, an oil-bath air cleaner, a gasoline filter, a pump and splash lubrication system and a 1-gallon overhead fuel tank.

New literature describing in greater detail these new power plants which are designed for all-round service for continuous or stand-by operation on construction jobs, in field repair shops or in highway department depots and garages may be secured by those interested direct from the manufacturer or from this magazine.

Gasoline and Diesel Trucks in 1942 Line

Streamlined gasoline and diesel-powered truck chassis in gross capacities up to 33,700 pounds, with tractor and trailer combinations up to 68,000 pounds, are included in the 1942 line announced by Reo Motors, Inc., Lansing, Mich. Retaining Reo's fundamental principles of design, the new models are featured by larger engines with increased torque and correspondingly heavier drive lines. Power for an even broader range of hauling requirements is thus provided.

Other features of the 1942 Reo's are 2 to 4 feet shorter turning radius, extra heavy chassis frame construction, interchangeability of units, and accessibility of all major mechanical parts. Power is furnished by 6-cylinder 7-bearing engines ranging in displacement from 228 to 517 cubic inches, with torque capacities of 177 to 369 foot-pounds. Four-speed transmissions with helical countershaft and helical third gear are standard on Models 19, 20, 21 and 22, with five-speed transmission or auxiliary transmission available at extra cost. Models 23, 23H, 25 and 27 have five-speed direct or overdrive or auxiliary transmission as standard. All models are fitted for hydraulic pressure chassis lubrication.

Dayton Coupling Line Taken Over by Dresser

Announcement has been made by the National Supply Co., Pittsburgh, Pa., of the sale of manufacturing equipment, molds, patterns, trade names, trade marks and patents held by the Dayton Coupling Division to the Dresser Mfg. Co., Bradford, Pa. This line includes couplings, gaskets, fittings, saddles, split repair sleeves and accessories. Replacement parts for Dayton couplings and accessories now in use may be secured from Dresser Mfg. Co.

Concurrent with this announcement is the news that the National Supply Co. has been appointed by Dresser as national jobber for Dresser products and will henceforth stock and sell Dresser couplings, fittings, repair clamps and sleeves, and extra parts.

HERE'S JUST WHAT CALCIUM CHLORIDE DOES FOR COLD WEATHER CONCRETE!

1—REDUCES COST—Cuts delays between operations . . . saves on forms, fuel, heaters and canvas . . . permits quicker finishing.

2—CUTS SETTING TIME—Nat'l. Bur. of Std's. tests show actual time of initial and final set are reduced ⅔ when calcium chloride is used.

3—PRODUCES HIGH EARLY STRENGTH—For example, calcium chloride increases one day strength of 40 degree concrete by 300% as compared to same concrete without calcium chloride . . . increases 3 day strength 117%, 7 day strength 75%.

4—INCREASES FINAL STRENGTH—National Bureau of Standards and P. C. A. tests show calcium chloride increases ultimate strength by from 7 to 12%.

5—ADDS EXTRA PROTECTION—Solvay Calcium Chloride in the mix gives *extra* protection against frozen concrete by speeding set and increasing early strength!

6—PROVIDES DEPENDABLE CURING—Assures positive, uniform curing in all concrete, including paving, structural and products.

7—SHORTENS PROTECTION PERIOD—by speeding set and increasing early strength, Solvay Calcium Chloride cuts winter protection period in half . . . shortens danger period.

8—PERMITS LESS FORMS—Earlier release of forms permits quick reuse . . . fewer needed.

9—INCREASES DENSITY AND HARDNESS—Solvay Calcium Chloride permits reduction of water-cement ratio . . . means fewer water voids, denser, more moisture-resistant concrete.

48 Page Book Gives National Bureau of Standards and Other Tests . . . Mail Coupon for Free Copy.

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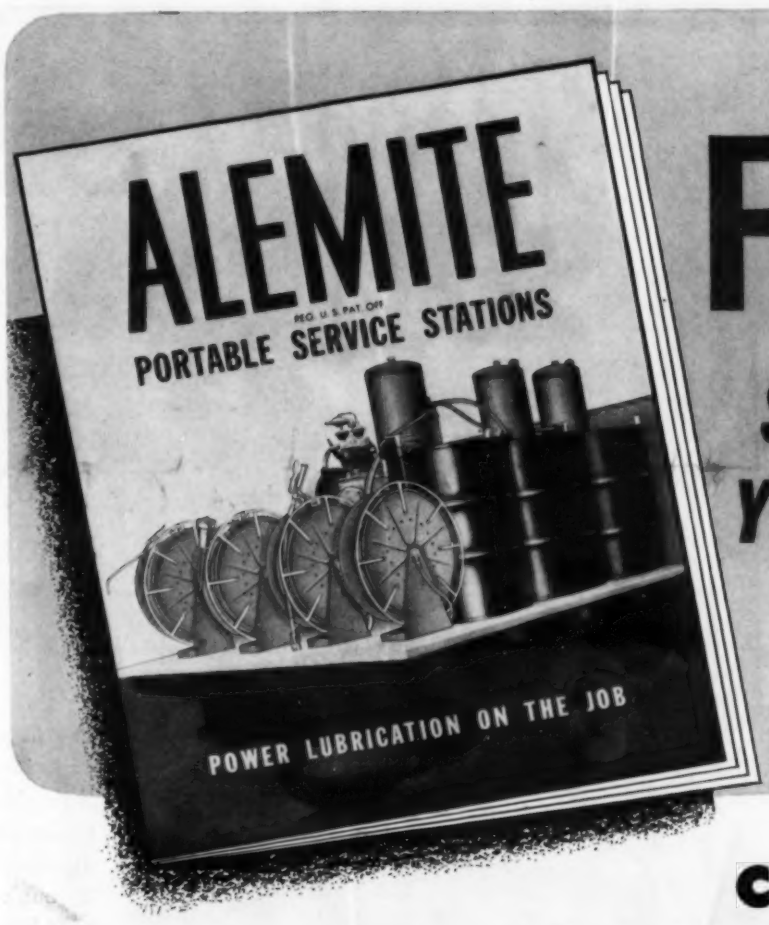

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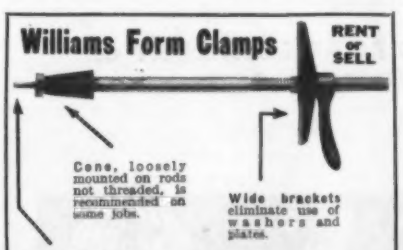
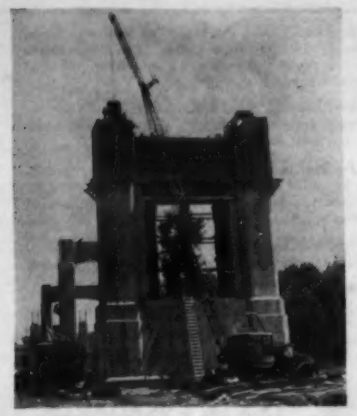

Cone, loosely mounted on rods not threaded, is recommended on some jobs.
Wide brackets eliminate use of washers and plates.
Inside rods have 1½" of threaded end to bond patch which will stand a hammer test.

Write for circular
WILLIAMS FORM ENGINEERING CORP.
GRAND RAPIDS MICH.



A P & H truck crane spotting a 5,000-pound concrete bucket.

Crane and Long Boom Used on Bridge Job

A P & H 255-A truck crane with an 80-foot boom and a 30-foot jib is being used by A. I. Savin Construction Co. of East Hartford, Conn., for pouring concrete in the uppermost forms for the piers of the giant new bridge being constructed across the Connecticut River at Hartford, Conn. The unit accurately spots a 1-cubic yard concrete bucket, weighing 5,000 pounds when full.

It is stated that this truck crane model is particularly suited to such jobs because of its planetary boom control and hydraulic control which permit accuracy and smoothness even with such a long boom.

New Lubricating Oil

The new Quaker State HD lubricating oil for use in trucks, tractors and other automotive equipment, either gasoline or diesel-powered, is designed for heavy-duty service in modern high-speed units.

Quaker State engineers and technicians state that motor oil is as much a mechanical part of modern engines as pistons, crankshafts, and other metal parts, and that a motor oil should be designed to fit the requirements of the severe service to which modern engines are subjected just as the metal parts are designed to fit precisely. Truck engineers have indicated that a satisfactory motor oil should have the following properties: first, it should not form decomposition products in the high-temperature regions of engine pistons; second, it should be highly resistant to oxidation and to the formation of sludges; third, it must have the property of detergency, which means preventing soot, carbon, fuel residues, dust and dirt which accumulate in the oil from sticking to engine working parts; and fourth, it must not oxidize to form organic acids which will corrode sensitive alloy bearings.

With these requirements as a guide, Quaker State HD oil was designed, made of a highly refined high-quality mineral oil to provide maximum basic stability, with which is compounded an oxidation and corrosion inhibitor and a detergent, and has been made available only after extensive tests in the laboratories and in actual service on the road.

Bulletin HD-41, discussing the properties of Quaker State HD oil as well as describing many of the tests to which it was subjected before being released for distribution, may be secured by interested contractors and state and county highway engineers direct from the Quaker State Oil Refining Corp., Oil City, Pa., by referring to CONTRACTORS AND ENGINEERS MONTHLY.

New Special White Cement For Curbs and Center Lines

A new handbook on the use of Trinity White cement, recently issued by the Trinity Portland Cement Co., includes information on the use of this special white cement in reflecting curbs along streets and highways and for white center stripes which are poured into the pavement during the process of its construction. The brilliance of this white cement, combined with white aggregate, makes such curbs and stripes stand out clearly, in rain or shine, as a guide to motorists, the booklet states.

Copies of this handbook on Trinity White cement may be secured by those interested direct from the Trinity Portland Cement Co., Republic Bank Bldg., Dallas, Texas, or 111 West Monroe St., Chicago, Ill.

The New KEYLODE Contraction Joint—

Highlights of this new joint:

1. A rigid, fully assembled unit for transverse contraction joints, ready to be spiked to subgrade. (No dowel bars required.)
2. The heavy plate shoes with arm braces insure uniform installation alignment of dowel plate.
3. The concrete slab edges are interlocked above and below the 12-gauge key-plate to transfer heavy traffic loads.
4. Economy in initial cost and lower installation cost mean a substantial saving over present dummy-joint methods.
5. The KEYLODE contraction joint, with 12-gauge plate dowel, also acts as a seal, and with the 20-gauge dividing plate held 4½" below top of slab, eliminates the necessity of edging and filling top of joint.
6. KEYLODE contraction joints are furnished crowned or straight, as may be specified, and are shipped painted and greased. (To break bond.)

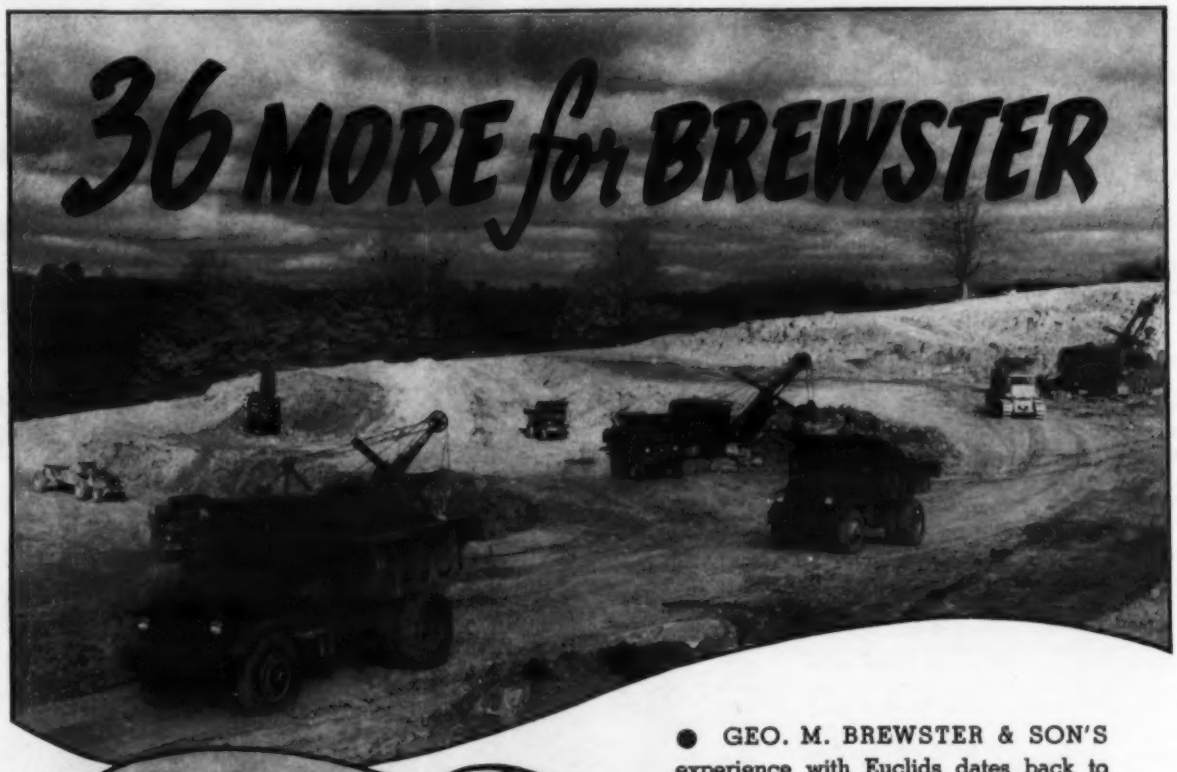
Write
HIGHWAY STEEL PRODUCTS COMPANY
Chicago Heights, Ill.

THERE'S NO SUBSTITUTE

FOR ROSS plows with their scientifically designed "Sno-Flo" moldboards that pick up the snow and roll it. That is why they will go thru deep drifts and hard packed snow with less power. They are built to give more years of service at less cost for upkeep.

There is a large variety of models and sizes for trucks and tractors. See your nearest dealer or write for Catalog "L".

Engineered and Built by the
BURCH CORPORATION
Crestline, O.
Builders of Equipment for more than fifty years.



MERRIMAN AND NEVERSINK DAMS
for Board of Water Supply of the City of New York

● GEO. M. BREWSTER & SON'S experience with Euclids dates back to the pioneering days of self-powered rubber-tired earth and rock hauling equipment for heavy construction. Through the years this company has used Euclids to haul most of the excavation on its many contracts — both large and small . . . Brewster's men know Euclids "inside and out" . . . what they will do . . . how economical they are.

That's why Brewster purchased thirty-six more Euclids this year . . . twenty-two 13-yard Bottom-Dumps and fourteen 15-ton Rear-Dumps. Brewster's choice of Euclids to increase his hauling capacity is positive proof of *EUCLID long-term performance, economy and dependability!*

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

●

EUCLID SELF-POWERED EARTH • ROCK • COAL • ORE **HAULING EQUIPMENT**
And — CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS

Dustless Highways For Vacationists

Michigan Makes Liberal Use Of Calcium Chloride to Bind Surface of Gravel Roads for Holiday Travel

(*Photo on page 44*)

✦ THE Upper Peninsula of Michigan is an ideal vacation land, and State Highway Commissioner G. Donald Kennedy sees to it that there is nothing about the roads to mar the pleasure of the local resident or the out-of-state visitor over the major holidays. Maintenance continues as usual throughout the year, but the heavy travel of such weekends as Memorial Day, Fourth of July and Labor Day, calls for extra effort on the part of the Maintenance Department to be sure that all shoulders are mowed, necessary detours are in the best of condition, frost boils are cleaned up and patched with stabilized gravel, and all the gravel roads are given an extra shot of calcium chloride to keep the dust from obscuring the scenery and approaching traffic.

Prior to the Fourth of July weekend, a total of 5,000 tons of chloride was applied to over 2,500 miles of gravel roads in Michigan. The method was quite similar throughout the state, and the application was 2 tons per mile per 20-foot width of road. When stabilizing a road surface for mixing, only 1 ton per mile per inch of stabilized depth is used, the extra application for surface treatment being aimed to reduce the dust and to reinforce the bond of the already stabilized mix.

We noted one of the maintenance trucks operating about 5 miles north of Bruces Crossing, which is the junction of U.S. 45 and the east and west state highway, No. 28. A Ford truck packed full of 100-pound bags of Columbia calcium chloride was pulling a Broadcast lime spreader. Ahead of the spreader, a tank truck watered the grade to insure the quick penetration of the chloride in the surface. These tanks are removable and are carried on heavy trucks, which are also equipped with underbody blades for regular maintenance.

The men on the chloride truck filled the hopper of the lime spreader, and then the truck pulled ahead at about 6 miles per hour while the men dumped as many more bags of the chloride into the hopper as they could before it was emptied and the truck stopped so that the hopper could be refilled.

New Waterproofing

Four new waterproofing compounds for sealing concrete, brick, stone and other types of masonry, as well as for wood and composition materials, are made by the Primoid Products Corp., 103 Park Ave., New York City. These Primoid products can be used to prevent or correct any leakage problem from mere moisture to a flowing stream, it is stated.

One of these is Primoid Standard, a clear rubber-base liquid which can be either sprayed or brushed on, penetrating into the pores of the material to be waterproofed, sealing the surface and adhering permanently. The manufacturer states that it will not crack or peel off, and that it is not affected by heat or cold. Either dry colors or colors ground in oil can readily be mixed with Primoid Standard, and it can also be used as a coating for metals, as it resists corrosion, acids and other chemicals.

Primoid Standard is available in 1 and 5-gallon cans and in 30 and 55-gallon drums, and has a coverage of 300 to 800 square feet per gallon, depending on the porosity of the material being coated. As it is manufactured from a chlorinated rubber base, on which there is no priority at the present time, there is no difficulty in securing it promptly in the amounts needed.

Further information on Primoid Standard and the other Primoid waterproofing compounds may be secured by interested contractors and state and county highway departments direct from the manufacturer by mentioning this item.

New Arc-Welding Rods For Equipment Repair

The new arc-welding rod developed at the LeTourneau plant at Peoria, Illinois, expressly for the various welding applications used in the manufacture of LeTourneau equipment is now available for general maintenance work through Caterpillar-LeTourneau distributors, according to R. G. LeTourneau, Inc., Peoria, Ill. These Tournaweld electrodes have been in use for over two years in LeTourneau plants, during which time the company has used more than 4,000,000 pounds for welding mild steels and special analysis steels in the manufacture of LeTourneau products.

Tournaweld is available in 5/16, 9/32, 1/4, 7/32, 3/16, 5/32 and 1/8-inch sizes. Additional information on Tournaweld may be secured direct from LeTourneau by mentioning this item.

Contractors Need Transport Mixers!

Open top provides visible mixing with ease of loading.

•

Side and rear discharge for widening, patching, paving, and bridge and culvert construction.

•

Inexpensive to own and operate.

CONCRETE TRANSPORT MIXER CO., INC.
600 ROSEDALE AVE., ST. LOUIS, MO.

POWER speaks louder than words

NOW—
115 horsepower
IN 1½-TON DODGE TRUCKS
120 horsepower
IN 1½-TON SPECIAL

PLENTY OF POWER—in a truck that *fits the job*—means *extra* performance, *extra* dependability, *economical* operation and *extra long life!*

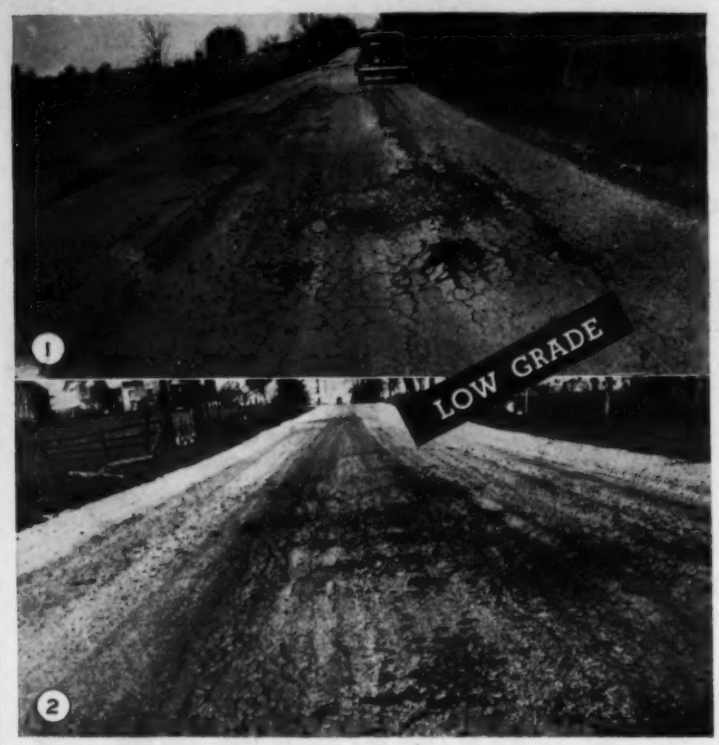
That's the kind of truck *you* want and *need* today—and that's the kind you get when you get the *right* Dodge *Job-Rated* truck to *fit your job*. See your Dodge dealer . . . *today!*

Prices and specifications subject to change without notice.

DODGE PRODUCTS FOR NATIONAL DEFENSE:
Command Reconnaissance Cars • Field Radio Cars • Troop and Cargo Motor Transports • Weapon Carriers • Army Carry-Alls • Ambulances • Duralumin Forgings for Bomber Fuselages • Parts and Assemblies for Anti-Aircraft Cannons.

Better BECAUSE OF CHRYSLER CORPORATION ENGINEERING

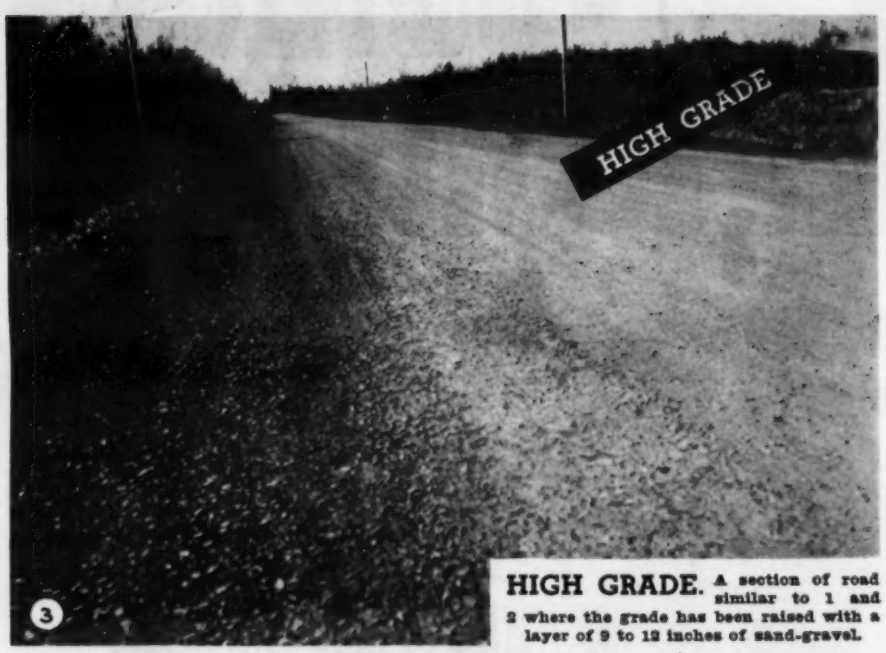
DEPEND ON DODGE Job-Rated TRUCKS



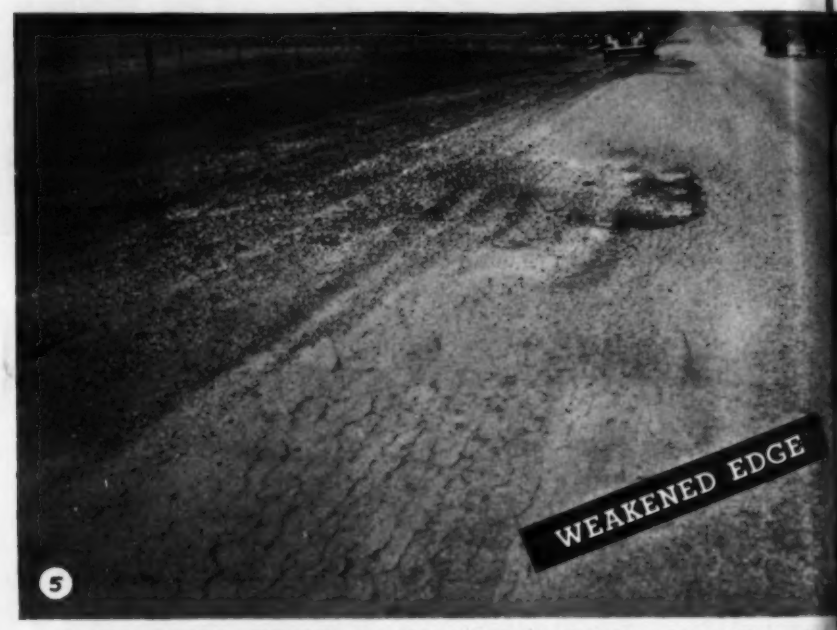
LOW GRADE. This road was trenched into surrounding terrain, with the result that water from the side hill runs down and percolates under the road surface, weakening the subgrade. The soils in this particular area generally give no trouble if the grade is high enough above the adjacent ground.

Strengtheni S
Treatment I
Prevention S

A. T. Bleck, Co ctio
Wisconsin State way
Diagnoses Some way
Suggests the fo



HIGH GRADE. A section of road similar to 1 and 2 where the grade has been raised with a layer of 9 to 12 inches of sand-gravel.



WEAKENED EDGE. A condition similar to that shown in 4, with an edge failure of a feather-edge type of gravel surface which had been weakened further by scalping the aggregate from the surface to construct the bituminous mat. This robbing of the edge is due solely to the fact that grader operators find it easier to move the loose gravel at the edges than the compacted metal near the center.

ALLIGATOR. The general "alligatoring" of a surface of inadequate depth on heavy clay soil indicates a loss in the bearing value of the subgrade. This could probably be corrected by a greater depth of surfacing to distribute the load over a greater area of the subgrade, thereby lessening the load per unit of area, because subgrade pressures are inversely proportionate to depth of surfacing.

EXPLORING. On digging through the mat, only 2 inches of gravel was found under the bituminous mat at this point. This job was graded late in the autumn and much of the gravel was placed on a frozen distorted subgrade. Smoothing the surface over the irregular subgrade resulted in a non-uniform thickness of gravel, with the disastrous results shown.

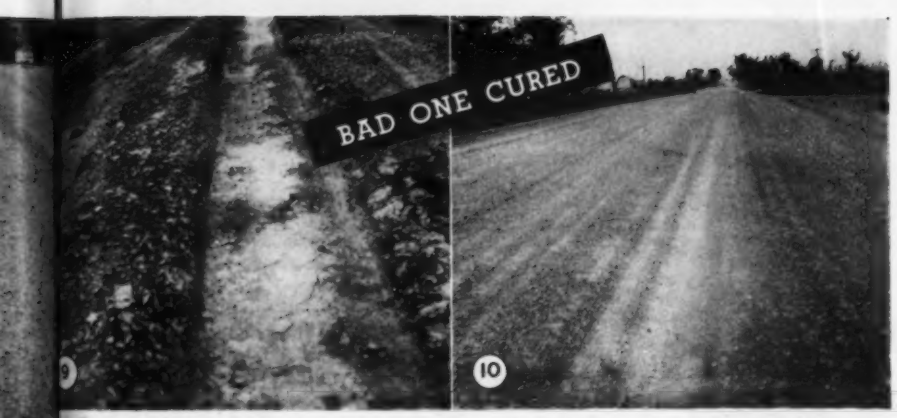
i Subgrades, t Frost Boils, n Snow Cracks

Co ction Engineer,
ate way Commission,
me way Troubles and
s th e for Them

SPONGINESS

A general break-up in a soil of high capillarity or sponginess. The water came up from beneath and froze. Thawing, starting at the top and possibly at the bottom, left a layer of ice, and drainage through adjacent frozen material was impossible. This condition results in a high moisture content in the thawed soil with consequent loss of bearing power and these results.

STABILITY. An 18-inch sand lift was built over this road in 1936. The conditions at either end of the project are as shown in 7. Here a lift of sand or other granular material allows water to bleed off before it is frozen, reducing ice accumulation in the subgrade; acts as an insulating blanket, slowing up the penetration of frost; permits accumulated moisture to bleed out when thawing starts; and distributes the load over a greater area of the subgrade which may be weakened by high moisture content.



BAD ONE CURED. Another bad one (9) and an adjacent section (10) where soil studies were made, bad areas excavated below subgrade and backfilled with granular material. A temporary surface was placed, the road opened to traffic and in the spring, before surfacing, weak spots were excavated and backfilled and in some areas the gravel surfacing was increased to 8 inches from 6 inches. The gravel met specifications of a graded aggregate base course. The result—last spring only one bad spot in 7 miles; the balance like that shown in 10.

FROST BOILS. A soil of high capillary brings up water which, on reaching the surface or a layer of frozen material, forms lenses of ice. Since latent heat is absorbed slowly before melting starts in the ice lenses, the frost in the surrounding area has gone out and that material subsided, leaving the frost boils above the adjacent surface. In 12, a frost boil has broken on the surface, showing clear water.

SNOW CRACKS. A name for these typical longitudinal cracks which appear in pavements laid on heavy clay. This condition occurs only in locations where snow drifting has occurred so that large amounts of plowed snow are placed on the shoulder close to the edge of the pavement. The snow insulates the shoulders against frost penetration, and when melting occurs, water enters the non-frozen area, gets under the edge of the slab, and reduces the bearing power of the soil. This creates flexual stress in the slab, causing the cracks. Pushing the snow back to the ditch is the cure for this. On new work in such soils, a blanket course of granular material will give more uniform subgrade support.

HEAVE. A concrete road will heave like this, and when the concrete slab heaves, it breaks. When the subgrade mires, the broken edges of the slab sink into it, squeezing out some of the muck and up-ending the slab, virtually destroying it. The only cure is to excavate the offending soil from ditch to ditch and backfill with granular material.

"CURED" SECTION. This road had everything the matter with it. Frost heaves, snow cracks and other troubles made it necessary to rebuild it completely on 18 inches of granular material. The road at either end of the rebuilt section was in lamentably bad condition last spring, with this "cured" section coming through without a wrinkle.

Oil-Aggregate Laid On Stabilized Base

(*Continued from page 2*)

road surfacing. The fines, passing a 10-mesh sieve, comprised about 50 per cent of the aggregate. The clay content was kept below 5 per cent, and 50 per cent of the coarse material had to be crushed. The asphalt content of the mix varied from 4 to 4½ per cent. The contractor on this job used Michigan oil, which has normally 80 to 85 per cent asphalt, and which had a viscosity of 350 to 600 at 60 degrees C. Approximately 4 per cent commercial filler dust was added to the mixture.

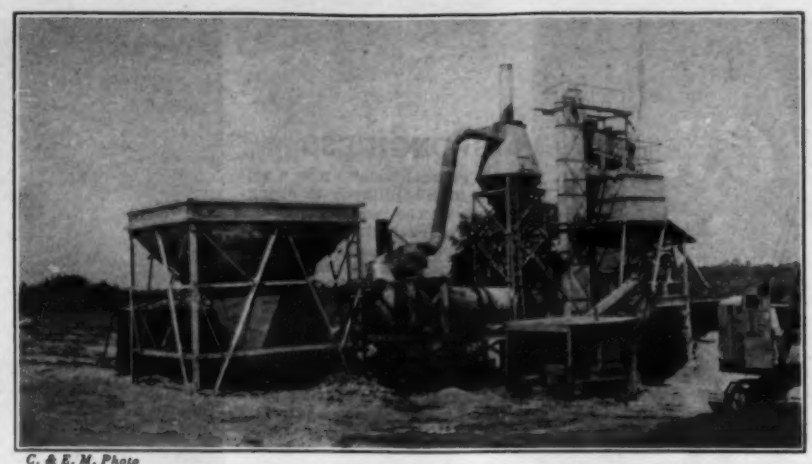
Plant for Oil Aggregate

The contractor set up his hot-mix plant at about the center of the job, just off the highway on the edge of a gravel pit from which he produced and stockpiled all of the stone required. An unusually close control of the feeding of the aggregate to the cold elevator was used on this job. A Northwest crane with a 1-yard Owen clamshell bucket supplied a large two-compartment steel hopper from which the material was fed to the elevator by means of a mechanical feeder. One compartment was used for the sand and gravel and the other for the added fines required. The material ran down through two chutes to a set of three gates controlled by hand levers, giving a very fine setting for the proportioning of the material as delivered to the elevator. In order to guard against extraneous material being delivered to the drier, all material ran over a screen placed between the delivery chute and the cold elevator.

The drier of this Hetherington & Berner plant measured 5 feet diameter x 20 feet long, and was fired with fuel oil. The hot elevator delivered the aggregate to the hot bin, and an adjacent compartment on the other side received the limestone dust which was raised from a ground hopper by a separate bucket elevator.

Asphalt was transported to the plant by tank truck, and delivered to a 20,000-gallon asphalt tank by a steam-driven asphalt pump. A horizontal portable steam boiler was used to furnish steam for the asphalt pump and for the steam-jacketed asphalt lines as well as for heating the storage tank. This tank was made of bolted sections, for ease in moving it from job to job. The drier was driven by a Plymouth gasoline locomotive mounted on skids and the wheels removed. The engine from another locomotive of the same make was used to drive the 2,000-pound-batch pugmill. Two Kron dial scales were used on the weighing platform, one for aggregate and the other for asphalt. The batch received a 10-second dry mix followed by a 30-second wet mix with the oil asphalt.

The hot-mix plant was operated for 12 hours, and the work on the road ran for only 8 hours. The material mixed before work started on the road was stockpiled adjacent to the plant, and then when work began on the road 1 yard of material from the stockpile was added to each load taken directly from the mixer. This had the result of increasing the production of the plant during working hours on the road. All material hauled from the plant was weighed on a Fairbanks platform scales.



C. & E. M. Photo
The set-up of the Hetherington & Berner plant used by Cooke Contracting Co. for the oil-aggregate mix on 8 miles of Michigan Route 171 and U. S. 23 at Harrisville, Mich.

Laying the Mix

Before the hot-mix could be laid on the road, the base was thoroughly reconditioned and then treated with 0.25 gallon per square yard of MC-1B prime material by the contractor, using his own distributor. Traffic was detoured for from 24 to 36 hours, depending on the weather, and then was turned in over the road to pound in the prime. Any pitting or breaks in the surface were patched with cold-laid oil aggregate before the actual spreading of the base and top courses began. The oil aggregate was laid in two courses, a bottom course of 1¼ inches compacted, and a 1¼-inch top course.

The oil aggregate as hauled to the road by truck was dumped into the hopper of an Adnun spreader which laid down a 10-foot lane on both bottom and top courses. The initial rolling for breakdown was done with an 8-ton Buffalo-Springfield gas-driven roller, and the remainder of the rolling was done by the traffic using the road. Better results were obtained if the initial rolling was held back until sufficient heat had

(*Concluded on next page*)

HEET-MASTER—SAVES 50% ON FUEL

HEATS TAR & ASPHALT TWICE AS FAST

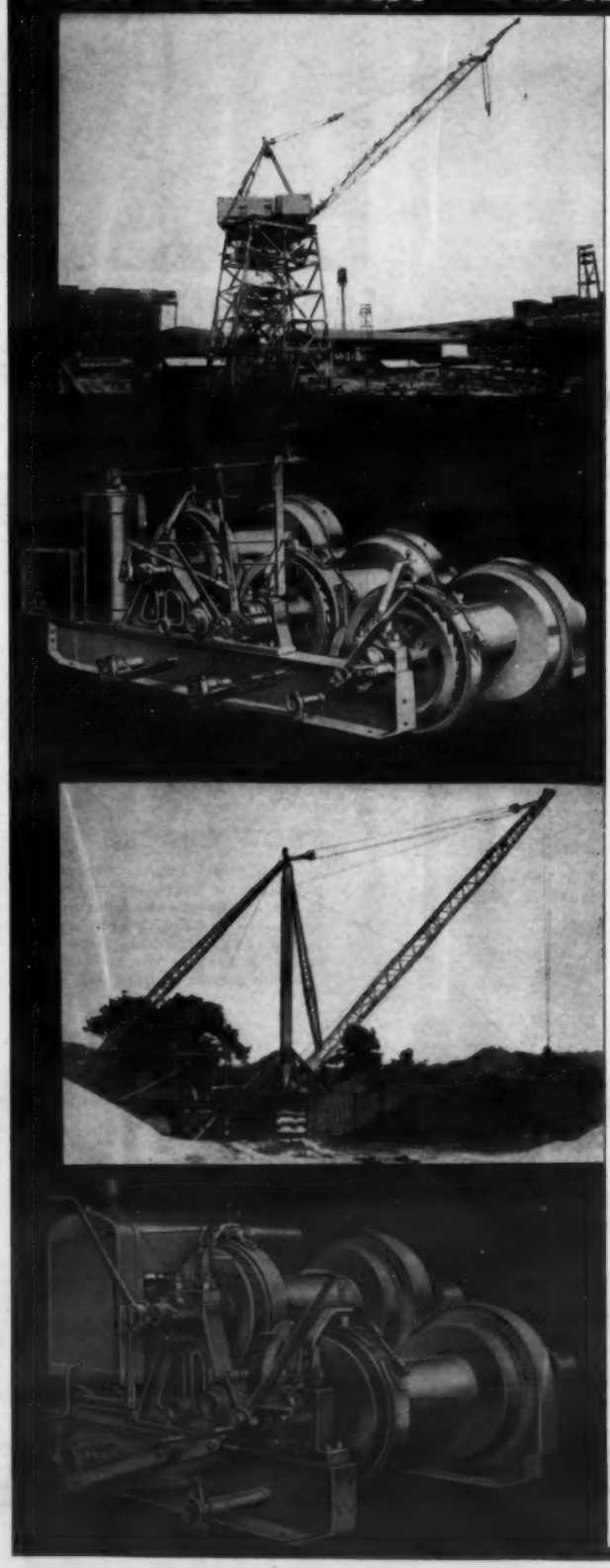
Send for Bulletin No. 196 HEET-MASTER Kettles for FREE on Contractors

AEROIL BURNER CO., INC.

5775 Park Avenue, West New York, N. J.

Chicago San Francisco Dallas

FOR "HE-MAN" CONSTRUCTION JOBS!



When the going is tough and you have a big job on your hands . . . then, more than ever, you'll need Clyde Quality Equipment. Hoists, Derricks and Whirleys that are designed to perform and built to endure . . . real "he-man" equipment for "he-man" jobs.

Clyde Whirleys . . . scientifically engineered to keep pace with the fast moving schedule of today's huge construction projects . . . ships, dams, locks or bridges. Seven standard sizes with lifting capacities up to 140,000 lbs. at a 35 ft. boom radius or 22,000 lbs. at 150 ft. Power can be electric, Diesel, steam, gasoline or Diesel-electric. Write for Bulletin K-12.

Clyde Electric Hoists are available in one, two and three drum types in sizes from 5 to 200 H.P. with line pulls from 1000 lbs. to 20,000 lbs. They are built with generous, easily adjusted brakes and frictions, wide bearings, husky shafts, and rigid, one piece steel bed frames . . . important factors toward greater safety, efficiency and economy of operation. Bulletin K-3 contains complete specifications.

Clyde Steel Derricks are designed to meet all the requirements in the construction and industrial fields for high quality, dependable derricks. All details have been given careful consideration in regard to materials, design and workmanship. Clyde guy and stiff-leg derricks range in capacities from one to 100 tons with boom lengths from 20 to 100 ft. Write for Bulletin K-9 for detailed information.

Clyde Gasoline Hoists are also built in one, two and three drum types in sizes from 8 to 120 H.P. and with line pulls from 1500 lbs. to 14,000 lbs. Similar in design to Clyde electric hoists, they embody the same outstanding features that make Clyde hoists first in the field. For details of construction and complete specifications, write for Bulletin K-4.

CLYDE

CLYDE IRON WORKS, Inc.

DULUTH, MINN.

Farm-To-Market Road In Michigan Improved

(*Continued from preceding page*)

left the mix; otherwise it would tend to shove under the rolls.

The contractor's personnel for laying the oil-aggregate surface was comparatively small for this type of work. Twelve to sixteen trucks were used to haul the aggregate mixture to the spreader from the asphalt plant in 5 to 6-ton loads. The workers on the road consisted of one road foreman, one spreader operator, one roller operator, and two rakers for joint construction. Five to six laborers were assigned to shoveling shoulder material at the pavement edge to protect it from slumping due to traffic. Two laborers handled the setting of the binder twine in 1,000-foot lengths ahead of surfacing operations for alignment.

The contractor was favored with unusually good hot, dry weather and was able to complete the entire 8 miles of paving in four weeks.

Personnel

This contract for 8.34 miles of oil-aggregate pavement was awarded to Cooke Contracting Co. of Detroit, Michigan, by the Michigan State Highway Department, G. Donald Kennedy, Highway Commissioner. The work was done under the direction of Howard Bacon, District Engineer, with R. A. Lawson as Project Engineer. H. Thompson was Superintendent for the contractor.

An Electric Tractor For Tunnel Clean-Up

One of the problems confronting Associated Contractors, Inc., of Valhalla, N. Y., on its contract on the Delaware Aqueduct was that of handling clean-up in the tunnel where the use of electric power is preferable to avoid the creation of noxious gases. Working in cooperation with the H. O. Penn Machinery Co., Inc., New York City, the contractor and dealer tried an experiment with electric power for the clean-up tractor.

The experimental work was done with an old Caterpillar Model 40 tractor with a LaPlant-Choate bulldozer, and it was found that electric power was a sound idea but that the tractor was too large. Accordingly, a Caterpillar Model D4 tractor, equipped with a LaPlant-Choate hydraulic bulldozer, was selected as the most suitable size. The engine was removed and a 20-hp electric motor was installed in its place. As the bottom surface of the tunnel is circular, a special bulldozer blade was designed having the same radius as the tunnel. This unit left very little clean-up work to be done by hand.

Other contractors working on the tunnel soon ordered these units also and in a short time Seaboard Construction Corp., Utah Construction Co., Inc., Frazier Davis Construction Co., Dravo Corp., Pleasantville Constructors, Inc., S. A. Healy Co. and Samuel R. Rosoff, Ltd., had similar units in service.

To take care of needed repairs to equipment working on the Aqueduct,

A Caterpillar tractor equipped with an electric motor and a LaPlant-Choate bulldozer used for clean-up on a section of the Delaware Aqueduct.

which included mainly repair to the tractor treads and to bulldozer blades, a special parts depot for Caterpillar and allied equipment is maintained at Lackawack, N. Y., by the H. O. Penn Machinery Co.

Chain Belt Promotions

The Chain Belt Co., Milwaukee, Wis., which this year is celebrating its 50th anniversary, has announced the organization of a new Division of Research and Development, to be headed by G. K. Viall, Vice President in charge of the Construction Machinery Division. Mr. Viall has been with the company since 1921.

B. F. Devine, who joined the Chain Belt organization in 1909, has been promoted from Sales Manager of the Construction Machinery Division to Manager of that division. In his new position he will also continue to supervise the management of sales.

Other appointments in the Construction Machinery Division include that of A. W. Thomas as Sales Manager, D. A. Kalton as Assistant Sales Manager, and A. J. Frank as Assistant to Mr. Devine, Manager of the Division.

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT
Asphalt Joint · Rubber Joint
Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt
THE PHILIP CAREY COMPANY
Dependable Products Since 1873
LOCKLAND CINCINNATI OHIO

2½ years in Taconite

means the severest test of strength to men on the Messabi Range

PMCO

WELDED DIPPERS

THE welded construction of this 4¾ yd. dipper gives maximum strength to withstand years of digging in this tough iron ore overburden—Taconite. Welded construction gives full capacity to the shovel working in this heavy material by eliminating unnecessary weight in the body of the dipper.

Typical Taconite

• This PMCO welded dipper has been in constant use for over 2½ years. Notice how the riveted front is worn smooth but still good for years of service. Successful performance of this dipper has brought many more orders for PMCO Welded dippers from this user.

Your material can be handled faster and at less power cost with a PMCO Welded Dipper.

We operate the largest and most complete manganese steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION
Established 1880
4710 West Division Street, Chicago, Illinois

Special Equipment For Snow Removal

(*Continued from page* 16)

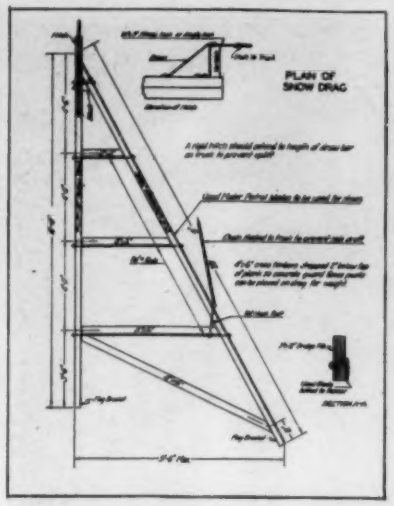
snow-plow manufacturers, developed a suitable hitch so as to make possible the development of such an adjustable-angle one-way plow.

The Maintenance Department now has several plows of this type, and the operators approve its performance. Its main advantage is in removing light fluffy dry snow at high speed with a more nearly flat angle than can be used for a wet slushy snow. The plow can be adjusted to meet almost any snow condition. As fast as is practicable the Department has been replacing the old bulldozer-type slow-speed plows with modern-design high-speed displacement plows.

Several innovations have been designed because of necessity. One is a widening wing, mounted on a motor grader or truck, devised in our Sixth Division, at Garden City. This wing, shown on page 16, is an old 16-foot moldboard with a cutting edge, mounted on the side of the motor grader or truck. The inner connection is made by a sliding bearing on a vertical pipe. The inner end of the blade may be raised 5 feet above ground level or lowered to the ground. The outer end is connected by cable to a gear and winch arrangement operated by the power control unit controlling the side swing of the motor grader moldboard. By adjusting the pitch of the moldboard, it can be made to suck in enough to carry a full load without additional weight or downward pressure.

Another development is a small drag, the design of which is shown in the accompanying diagram. The usefulness of this equipment is limited to light snows of not more than 3 or 4 inches, and it is especially adaptable to cleaning shoulders, particularly when the ground is not frozen underneath a light covering of snow.

Because highways must be kept clean 24 hours a day, it has been necessary to devise a distinctive lighting system for all snow-removal equipment. After experimenting with various types of warning lights, we found the 6-inch blue flashing light to be the answer. This light is merely a head lamp with a blue lens mounted on a bracket, with the bi-metal



flasher installed in the line. Two lights are installed in each unit on conventional-type trucks. The blue lamp facing forward is mounted on a bracket one foot above the top of the cab so that raised head lights on V-type plows will not interfere with the blue light. The second lamp is turned to the rear on the back of the cab and is not raised or placed on a bracket.

After a heavy snowfall without wind, we have found plowing ridges in the fields adjoining the highway to be a good drift preventive measure. These ridges act as snow fences.

Various types and makes of snow plows are used in the Department and standardizing on snow-plow shoes has effected a great saving. There are many small foundries in Kansas, and we have been able to mould our own shoes and hard-surface the bottoms. By standardizing the shoes and methods of attachment, it is not necessary to carry various types and sizes in stock, only to find the stock depleted when a certain set of shoes is wanted immediately.

Procedure for Snow Removal

General procedure for snow removal has been established, to be followed by all divisions during the winter months. By October 15, each division engineer had prepared a snow removal map for his division, showing the available equipment and operators, and the particular section of road for which each is responsible. Such standardization is a working base only, because no snow storm strikes at all places at once and plans must be flexible to meet any emergency.

Certain storms may be localized. If there is unexpected delay in snow clearance, because of equipment breakdowns, other equipment may be rushed to the points affected at any time, day or night. During a storm, each supervisor directs the activities of his equipment from the office. Information on all phases of removal work is relayed constantly to the division office. At predetermined intervals, each division office reports to the headquarters office at Topeka on the progress of the work. All offices are kept open 24 hours a day.

If the storm is severe, exact information is given the public through local radio stations and the press. The High-

(*Concluded on next page*)

CUMMER
ASPHALT
PLANTS

Portable Combination Hot and Cold Mix Plants
Portable Hot Mix Plants
Stationary Combination Hot and Cold Mix Plants
Cummer Combination Dryer-Coolers.
Steam Jacketed Mixers 400 to 8000 pounds capacity.
Cummer Internal Fire Dryers
Electric Batch Timers

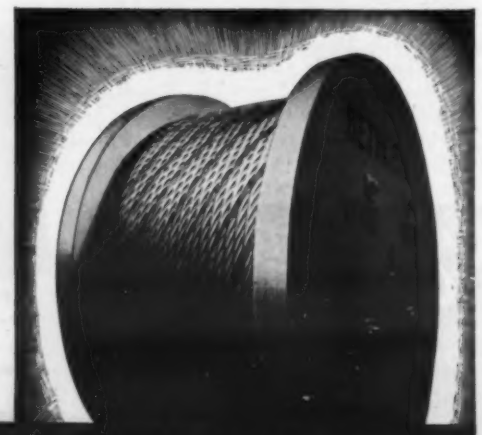
THE F. D. CUMMER & SON CO.
Euclid and 17th, Cleveland, Ohio

When you buy a wire rope with a purple strand running through it, you get the strongest, toughest steel used in commercial ropes—Improved Plow.

Then, when you specify that this rope be Form-set (pre-formed) you get a rope that's easy to handle, requires no seizing, won't wicker, spools better, is more resistant to bending fatigue.

Extra strength plus easy handling make a combination that can't be beat for the hard-running jobs. Next time you buy . . . how about it?

PURPLE STRAND
FORM-SET
WIRE ROPE



BETHLEHEM STEEL COMPANY

Handling Snow and Ice on Kansas Roads

(*Continued from preceding page*)

way Patrol and the Public Relations Department of the Highway Commission render valuable assistance to the Maintenance Department and to the traveling public during a snow storm.

Ice Control

Last year, the Maintenance Department used approximately 10,000 cubic yards of abrasive material in treating icy or snow-packed highways, especially on hills and curves. No. 4 rock salt and calcium chloride are used sparingly in material previously stockpiled for ice control.

The addition of salts, in crystal form or brine, effectively lowers the freezing point of the abrasive material and also tends to remove thin layers of sleet or ice under traffic. All maintenance men have been cautioned against allowing puddles or pools of the brine to stand on concrete or oiled surfaces, since it is possible to incur damage to the surface if the brine is allowed to remain any length of time.

Traffic-Created Problems

The most serious problem of the Maintenance Department during snow removal is the stubborn insistence of freight truckers and transport drivers to proceed on their routes without chains and to proceed, regardless of any advice. Some truckers will deliberately jackknife a tractor or semi-trailer in the middle of a road on a hill to prevent skidding, with the result that all traffic is blocked and the snow-removal crews must stop operations to run a wrecking service. We are glad to say that this type of driver is greatly in the minority.

The Highway Patrol renders valuable assistance in keeping the reckless and unthinking driver, both of trucks and passenger cars, somewhat under control. It seems that as soon as the first snow begins to fall, every person owning a motor car is anxious to get on the highways and see the snow storm. He has no place in particular to go, but if he inadvertently gets stuck or in trouble, his first thought is to call the Maintenance Department for assistance. Such assistance is willingly given if possible, but the primary objective of our department is to get all highways open and keep them open during the snow storm. We want to keep the public rolling.

Material-Handling Units Described in New Booklet

Electric motors and controls for cranes, hoists, and gantry bridges for use in construction projects, industrial plants and central stations are described in a new 20-page booklet announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna. Features of a-c and d-c motors up to 600 hp for typical material-handling operations are discussed, with a note on gear motor applications, and controllers, protective devices, and methods of motor braking are described and illustrated. A 2-page application chart facilitates the selection of motors and control for material-handling operations.

A copy of this booklet, B-2264, may be secured direct from the manufacturer by writing to Department 7-N-20 and mentioning this item.

New Folder on Convertible ½-Yard Crawler Excavator

The Link-Belt Speeder Corp., 301 West Pershing Road, Chicago, Ill., has recently published a new 4-page folder, No. 1914, illustrating and describing its ½-yard Model LS-50 crawler shovel-dragline-crane. Particular attention is given in the folder to some of the new design features of this excavator, such as the machine's non-clogging crawler treads, alloy-steel all-welded lower frame, and the simplified design of the upper machinery. Clearances, dimensions, lifting capacities, and brief specifications are also given.

Copies of this new folder may be obtained direct from the manufacturer.

STERLING BALANCED WHEELBARROWS

11/32" dia., continuous butt-welded rod in top edge of trays, Double thickness of metal at tray laps crimped over rod.

NO. S-18 CONCRETE BARROW WITH PNEUMATIC TIRE WHEEL

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

The Original BucketruX

Trade **DEMPSTER DUMPSTER** Mark

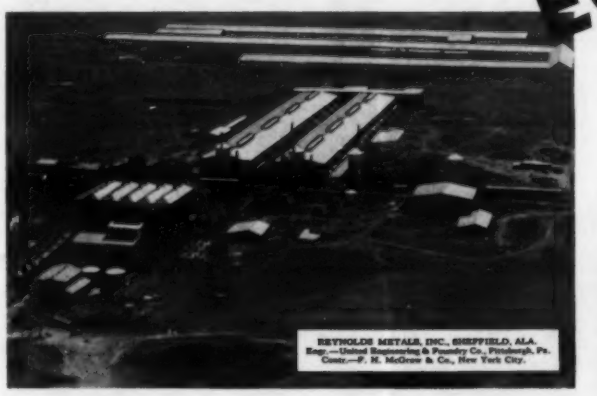
Reg. No. 363486

Mfgd. by

DEMPSTER BROTHERS, Inc.

Knoxville, Tenn.

CEMENT DISPERSION *means* ECONOMY..

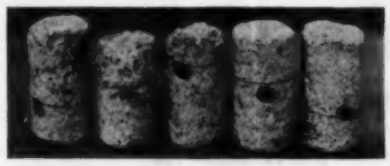


REDUCES WATER UP TO 20%
INCREASES WORKABILITY 150%

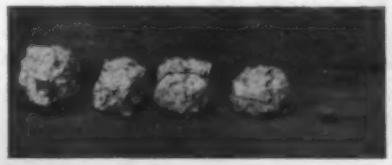
ECONOMY — *actual savings* — are now assured on all types of concrete through the use of ***Cement Dispersion*** — the most startling technologic advance in the concrete industry in a decade.

So effective is ***Cement Dispersion*** in decreasing the water required for a given consistency, that ***Pozzolith*** eliminates up to one gallon per sack of cement. Immediately the durability goes up and the cost of concrete construction goes down.

PROOF OF DURABILITY



Pozzolith concrete after 150 cycles of freezing and thawing lost only *10% by weight.*



Plain concrete after 150 cycles of freezing and thawing lost *73% by weight.*

These specimens were made of identical mixes. Dispersion of cement in Pozzolith concrete specimens permitted 15% less water (1.7 gallons less per sack of cement).

Send for the complete story on Economies of Cement Dispersion and Pozzolith.

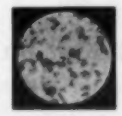
HOW CEMENT DISPERSION WORKS

Only a part of the cementitious value of the cement, whether normal portland or high early, is utilized under usual construction conditions. Investigation shows that with 28 days curing only 50% hydrates. [Anderegg and Hubbell, A.S.T.M. 29 II 554 (1929)].

Dispersed cement produces 25% to 40% higher compressive strengths.

WITHOUT POZZOLITH

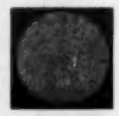
Cement particles in their normal state in water tend to gather in bunches; i.e., flocculate. Water never reaches some particles and many are only partly hydrated. This reduces the effectiveness of the cement, entraps water within the clumps, requires an excess of water for placement and often results in bleeding and segregation. See photomicrograph at right.



UNDISPERSED

WITH POZZOLITH

With Pozzolith the dispersion principle operates to drive each particle apart, thus exposing all the cement particles to the vital hydrating action. See photomicrograph at left.



DISPERSED

This dispersion makes the cement usable to its maximum efficiency since all the water is made available for lubrication of the mix and the entire surface area is exposed for hydration.

In addition to Reducing Water, Increasing Workability and Durability, the use of Pozzolith produces these further structural advantages: —

1. High early strength — 20% or more increase in compressive strength at all ages.
2. Increased water-tightness — 20% or more reduction in absorption and permeability.
3. Reduced bleeding and segregation.
4. Reduced heat with minimum cement content.

WORKABILITY AND ECONOMY

Geo. E. McIntyre, Architectural Engineer, Jefferson City, Mo., who used Pozzolith on the Missouri State Penitentiary Concrete Wall says: —

"... the addition of Pozzolith increased the workability to such an extent that no difficulty was experienced in placing even under the most difficult circumstances. The concrete flowed perfectly, with a minimum of *placing labor* and gave a splendid appearing surface when the forms were removed.

"Pozzolith certainly lived up to your claims in this case in that it enabled us to maintain our established water cement ratio and at the same time produced the required plasticity."

THE MASTER BUILDERS CO.
CLEVELAND, OHIO TORONTO, CANADA

MASTER BUILDERS

The Dreyer concrete vibrator.

Three Types of Job With One Vibrator

A feature of the Dreyer concrete vibrator, made by the Dreyer Vibrator Co., 2416 E. Slauson Ave., Huntington Park, Calif., is that it will handle a variety of vibrating requirements merely by changing to one of the three vibrating elements furnished with each unit. For 6-inch walls and heavily reinforced members, the 2-inch o.d. element is recommended; for work in 8-inch walls and up, footings, and similar jobs, the 2½-inch o.d. element is used; and for heavy structures and dams, the 3-inch o.d. element is recommended.

The Dreyer vibrator is powered by a high-speed electric motor of 2-hp capacity operating on 110 volts, ac or dc. The motor has grease-sealed heavy-duty ball bearings, is enclosed in an aluminum case with fan ventilator and, it is stated, will run under continuous load 24 hours a day for long periods with a minimum of care. It has a rated speed of 8,000 rpm. The flexible driveshaft is encased in a special rubber covering which is designed to resist cutting and abrasion. The vibrator element eccentric is enclosed by a case-hardened steel tube and runs on four grease-sealed ball bearings. The working length of the unit is 15.5 feet, with additional lengths available, if required.

Further information on the Dreyer vibrator and the concrete jobs on which it has been used is contained in a bulletin, copies of which may be secured direct from the manufacturer by mentioning this item.

Catalogs on Shovels

The line of shovels made by the Universal Unit Power Shovel Corp., Milwaukee, Wis., is described in four new bulletins recently issued by that company. Bulletin No. 113A describes its Unit 412 ⅜-yard shovel, a sturdy, compact, light-weight machine of simple design; Bulletin No. 114A covers its Unit 514 ½-yard shovel; Bulletin No. 108A, the Unit 616 ⅝-yard shovel, and Bulletin No. 112A the Unit 1020 ¾-yard shovel. Each shovel, which is easily converted to trench hoe, clamshell, dragline, backfiller or crane, is illustrated and the construction features described in detail and general specifications given. Crane radius diagrams and loading charts are also given for each model.

Copies of all four bulletins or the one covering the shovel in which you are interested may be obtained by writing direct to the manufacturer and mentioning this item.

New Tracing Cloth

Good clear blueprints can be made from pencil tracings on the new white tracing cloth made by the Frederick Post Co., Box 803, Chicago, Ill. It is stated that every pencil mark or line on this No. 123 Whitex tracing cloth is dense and sharp, due to its specially processed velvety surface. Its glossy "stay clean" back is an added feature and its extra transparency adds speed to print production, it is claimed.

Because of the high degree of transparency and its texture, jet black on white positive prints may be obtained, as well as knife-sharp major-contrast blueprints, from pencil drawings. Whitex erases quickly and cleanly with art gum or a soft eraser, and erasures do not show on the blueprint. The manufacturer states that this new tracing cloth makes it possible to produce in fine detail and at pencil speed ink-quality professional-appearing blueprints from pencil drawings.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may secure samples of Whitex direct from the Frederick Post Co. by mentioning this magazine.

Want information on equipment? Write the Editor.

New Power Charger And Lighting Plant

The Sea-Pal power charger and light plant, made by the Sea-Pal Radio Co., 228 No. LaSalle St., Chicago, Ill., is a new electrically started lighting plant operating through a standard automotive battery, providing ample capacity for average needs. There are only three moving parts in the engine: the piston, rod, and crankshaft. The engine is direct-connected to the generator which has four poles and four brushes and is automatically lubricated.

There are three models available: Model 2406 is a 6-volt 240-watt unit; Model 35012, a 12-volt 350-watt unit; and Model 35032, a 32-volt 350-watt unit. All have a push-button self starter and automatic lubrication.

Further information on these power charger and light plants, and their many uses in furnishing electricity for charging batteries and similar service, may be secured direct from the manufacturer by mentioning this magazine.

New C-59 Paving Breaker

With the power of a heavyweight, and handling ease of a lightweight tool.

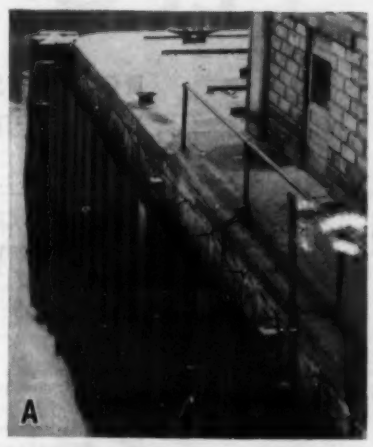
Other advantages:

- Fully air-cushioned
- Automatic lubrication
- Low upkeep cost
- Long life
- Low air consumption
- Fewer parts
- Rugged steel retainers, opened and closed with a kick of the heel
- Valveless
- Foreign matter passes through without interference and costly delay
- No freezing in even the coldest weather

Write FOR PARTICULARS

HARDSOCG DRILL CO. OTTUMWA, IA.

How to keep earth or water in its place . . . *and do it economically!*



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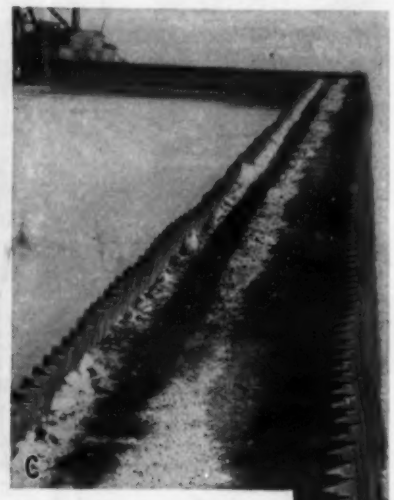


C

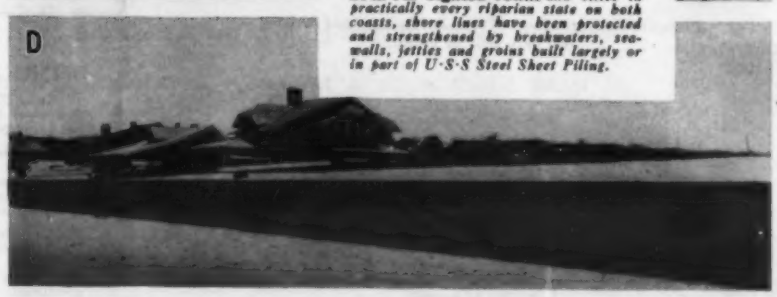
B

A. Solving a Problem *of lower lake levels.* (Upper left) *When the wooden bearing piles under their valuable Buffalo dock started to deteriorate due to exposure as the water level fell, the Spencer Kellog Company simply surrounded their dock on the water sides with a strong wall of U·S·S Steel Sheet "Z" Piling.*

B. At Cairo, Ill. *1100 tons of U·S·S Steel Sheet Piling in 12 to 36 ft. lengths, driven under a setback wall, reinforce and strengthen the Ohio River front protection and lower the seep line where existing levee appeared deficient in base section.*

C. 600 Tons *of U·S·S Steel Sheet Piling are used in this 300 ft. pier and breakwater* (upper right) *to assure permanent shore protection at North Shore Park, Chicago, Ill. Thousands of tons of U·S·S Sheet Piling safeguard this Great Lakes metropolis.*

D. In Far-Sighted Towns *and cities in practically every riparian state on both coasts, shore lines have been protected and strengthened by breakwaters, seawalls, jetties and groins built largely or in part of U·S·S Steel Sheet Piling.*



D

U·S·S Steel Sheet Piling efficiently answers most problems of control and retention

IF you are designing bulkheads and retaining walls, bridge piers and abutments, piers, docks, and wharves, lock and dam walls and cut-offs, cofer dams, or other marine or foundation structures, the chances are good that U·S·S Steel Sheet Piling will do your job more effectively and economically than any other method.

This superior and versatile piling has proved itself invaluable to engineers in projects involving the retention or control of earth or water. Great strength, long life, low cost of installation and low maintenance cost make U·S·S Steel Sheet Piling ideal for such construction.

Assembled in small, easily driven units, it forms a wall that is watertight and continuous—a sturdy barrier, free from marine borer attack and attractive in appearance as well. Each unit, positively interlocked to the next, offers a guaranteed strength of from 48 to 72 tons per foot against rupture or tension.

Available in straight-web, arch-web and in the new "Z" sections, U·S·S Steel Sheet Piling is a rugged, lasting product. A finished product as shipped—ready to be handled and driven under the most difficult conditions of soil, water or surf. We welcome the opportunity of discussing its possibilities with you.

U·S·S STEEL SHEET PILING

CARNEGIE - ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

Experimental Paving With a 9-Bag Batch

LaFera-Grecco Contr. Co. Used 34-E Paver on Wide Paterson, N.J., By-Pass With Varied Width Lanes

(*Photos on page 44*)

✦ SNOW in late November, 1940, put an end to a 3-day paving spree of LaFera-Grecco Contracting Co. of Newark, N. J., low bidder by a few hundred dollars on the 3.131-mile Paterson, N. J., by-pass. The heavy grading, including a long rock cut, had been completed to within 2 inches of final grade under another contract which included all but one of the five overhead roadway bridges and one overhead railroad bridge, as well as two highway underpasses and two railroad underpasses. This paving contract included grading and paving seven feeder ramps, and 3,000 feet of elevated sidewalks with pipe railing, of a total of 49,210 square feet of 4-inch thick concrete sidewalk.

The contractor started again April 22, 1941, finished the last of the paving late in September, and all items in the contract will be completed this month. While the contract was only 3 miles long, the concrete paving included four 10 to 14-foot strips 10 inches uniform thickness, the seven ramps 30 feet wide poured in two 15-foot lanes, and a number of approach lanes of varying widths, the whole concrete paving totalling 114,366 square yards of 10-inch slab.

A large portion of the paving was through a residential community, although isolated from cross streets by the design of the by-pass. The Clifton High School with 2,200 pupils is adjacent to the work, with a special traffic ramp built to the school, and a pedestrian tunnel, 154 feet long, crossing beneath the highway. Adjacent to this is Middle Village, containing 165 apartments.

The Experimental Batch

On this contract a 9-bag batch was used, mixed in a MultiFoote 34-E paver, producing 1.33 cubic yards or 4.83 square yards of 10-inch slab per batch. The specified mixing time was 1 minute and 55 seconds per batch in the drum. This batch contained 6.7 bags of cement per cubic yard, or 1.861 bags per square yard of 10-inch slab.

The batches were hauled by new Mack LM trucks carrying 6 batches per load, and only three trucks were required on the average 2-mile haul from the batching plant to the paver. These batch trucks in themselves are an innovation, being designed for a new bulk cement set-up, but the contractor on this job spotted the bags of cement in groups of nine for easy checking by the inspector along the subgrade just outside the forms. The cement was hauled by a flat-bed truck, with the driver and two laborers handling the unloading. The aggregate portion of this large batch contained approximately 4,700 pounds of sand and crushed stone. This volume of aggregates very well filled the batch compartment so that one man was assigned to spreading the top pyramid of the aggregates uniformly across the truck so that the batches toward the forward end of the body would not spill over into the lower batches when the body was raised for dumping into the paver skip.

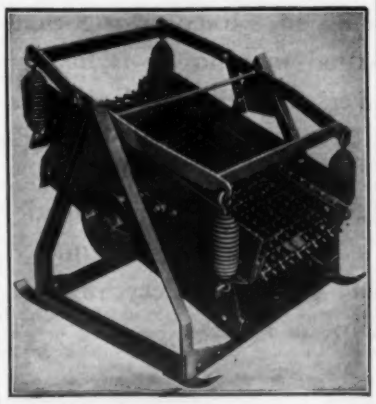
C. & E. M. Photo
Paving the approach ramps on LaFera-Grecco's 3.131-mile concrete paving contract on the Paterson, N. J., by-pass was complicated by the varying widths of slab, necessitating hand screeding.

Excavation and Forms

The character of the soil through which this contract runs is sandstone, sand and earth. The first work done on excavation was to grade out all the

(*Continued on page 36*)

A VIBRATING SCREEN THAT'S *PORTABLE*



An easy-to-move, completely set up unit that requires very little power (2-hp. gas engine or 1-hp. electric motor). Separates into three sizes of material accurately. 100 tons capacity per day. A money-saver on road and construction jobs, at small quarries, factories, concrete block plants.

Write for Bulletin No. 110

ROBINS CONVEYING BELT CO.
PASSAIC, NEW JERSEY

DUMPING – SPREADING *at High Speed*

SPREAD AND DUMP AT SAME TIME . . . . AT HIGH SPEED

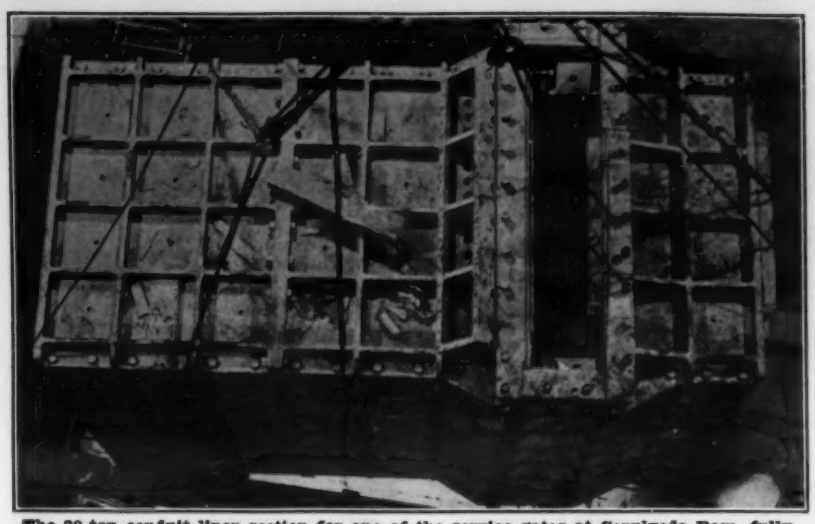
Dumping at travel speed...clean and quick . . . saves seconds . . . cuts round trip time . . . reduces dirt-moving costs. This important advantage of the Koehring Wheeler is only one of the many second-saving operations. Positive and quick, clean ejection of the load is assured by the forward movement of the rear apron, pivoting at the cutting edge. Front apron, has high dumping position for free, unobstructed dirt ejection. Delays on the fill increase the cost per yard. Koehring Wheelers waste no time on the fill.

KOEHRING CO • Milwaukee, Wis.

High, 21 inch clearance under cutting edge allows free dumping or controlled spreading . . . at high travel speed.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT



The 30-ton conduit liner section for one of the service gates at Sepulveda Dam, fully assembled, was picked up off the timbers and lowered into place.

Heavy Control Gates Set in Sepulveda Dam

Three 50-Ton Units Were Assembled at Site and Placed in Position with Speed and Efficiency

By FLOYD SUTER BIXBY

✦ BY using the best of modern methods effectively, the Jahn-Bressi-Bevanda Co., southern California contractors on Sepulveda Dam, (C. & E. M., Oct., 1940, page 1) were recently able to install four 6 x 9-foot service gates in the outlet structure of the dam in record time. Each gate was fully assembled in an average of five 8-hour shifts.

Weighing some 50 tons each, the big gates were shipped to Los Angeles by the Commercial Iron Works of Portland, Oregon, under a U. S. Engineer Department contract. Sepulveda Dam, part of the Los Angeles and Orange Counties flood-control program, is located on the Los Angeles River. The threat of flood danger on the river had scarcely subsided last spring when preparations were made to assemble the sections of the service gates in place.

The brunt of the heavy load had to be borne on the floor of the control house of the outlet structure. To transmit the load over as much floor area as possible during assembly, two 24-inch I-beams 30 feet long with 8-inch webs ½ inch thick were brought in. These formed a support for the big blocks necessary to lift the fully assembled conduit liner for each gate after it was assembled. In the center of the I-beams, and suspended between the two beams by 3 inches of steel stock, an 8-way sheave was placed. The hoist line, leading out the main door of the control structure to the front load drum of a Koehring 801 dragline located on the fill nearby, was rigged to lift the conduit liner very easily. A safety factor of 5 to 1 was used.

Erection

Under the supervision of Rigger Lee Meadows, the erection of the gates proceeded without mishap. The sections were hauled to the job by the Belyea Truck Co. of Los Angeles and unloaded by a Bucyrus-Erie 55-B crane. Close clearances in the conduit tunnels made it necessary to bring the sections in upended.

The conduit liner was fabricated in three main sections, all of which had to be joined together by the field crew. The upstream conduit liner was brought in first on a steel dolly which rolled along the concreted channel floor. This dolly was made of heavily braced 3 x 3 x ½-inch angle iron, and rolled along on ball-bearing wheels. A special track, made of 4 x 4 x ½-inch angle iron set on six legs of 6-inch I-beams, was set in the 2-foot deep gate blockout pit in the floor, flush with the floor line, so that the sections could be trundled into position directly under the location where they were to be assembled.

In order to work in as much room as possible, the upstream section of the conduit liner and then the downstream and middle sections in order were brought in and hoisted to the second floor where the hydraulic service cylinders sat after assembly. Two 14 x 14-inch Douglas fir timbers were laid longitudinally across the top of the blockout and supported by a vertical timber of the same dimension rising from the bottom concrete to the timber itself. This precaution was taken in order that the 14 x 14's would not break when the three 10-ton sections were assembled on them.

All flanged faces and the bolts were coated with white lead and graphite before joining the sections together. Air wrenches were not used on the 1⅛-inch bolts because there were not enough of them to justify it. Crescent 14-inch wrenches were used and the nuts gone over several times.

Installation

The whole secret of the fast and successful installation of the service gates lay in the arrangement of solid steel supports upon which the completed gates rested. Full length 6-inch I-beams were laid across the upstream and downstream ends of the conduit liners at right angles to the direction of flow. To make sure that the centers of the liners would not sag, four additional steel pedestals made of 8-inch I-beams were placed under each gate. These supports were set to grade with an instrument so that when the gate was placed down on the I-beams it would be within ⅛ inch of grade.

Before being lowered into position each liner was center punched inside in the direction of flow. Survey points were then placed in the center of the tunnels on the concrete floor, and a measurement from the hub established to the proposed downstream location of the conduit liner.

As soon as the pieces were assembled, slings were rigged around the 32-ton load and it was picked up about 2 feet by the dragline working outside. The timber supports were hastily removed by the riggers and the completed assembly

(*Concluded on page 40*)

For reducing
EQUIPMENT MAINTENANCE COSTS...

The SELF-LOCKING NUTS that can't be loosened by vibration or hard service

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Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Disadvantage of Being Superstructure Contractor

Where construction work can not be done by one contractor until another contractor has completed his work, contractor No. 2 must do more than was done in one New York case if he desires to preserve a claim for damages on being delayed through belated performance by contractor No. 1.

In the New York case (Taylor-Fichter Construction Co. v. Niagara Frontier Bridge Commission, 25 N. Y. Supp. 2d, 437) the plaintiff contracted to construct bridge superstructures upon supporting piers and abutments to be erected by another contractor.

After the work was done the plaintiff sued for damages because not permitted to do its work seasonably. The Appellate Division of the New York Supreme Court decided that damages were not assessable against the bridge commission, because it had not been guilty of any interference that delayed the plaintiff.

First, the court noted that, although the commission was bound to refrain from any act that would unreasonably delay the plaintiff or prevent the plaintiff from carrying the work forward with reasonable economy and dispatch, it was not liable for delay caused by the substructure contractor.

The plaintiff had specially rough going in court, because its contract explicitly provided that the commission should not be liable for delays caused by the substructure contractor, and that the plaintiff must cooperate with the engineers in coordinating its work with that of other contractors.

"Road Under Construction"

A highway construction project, under which one lane is left open for travel during the progress of the job, imposes duties upon the contractor which can not be ignored without subjecting himself or his insurance company to risks. The fact that the highway authorities maintain flagmen at the ends of the stretch left open to travel does not free the contractor from responsibility for negligently permitting that stretch to remain in dangerous condition.

A situation dealt with by the Oklahoma Supreme Court in the case of Toler v. Hawkins, 105 Pac. 2d, 1041, was a common one and therefore the decision reached by the court should be heeded.

A state highway contract required that one half of a half-mile stretch of road be left open to travel while the other half was being reconstructed. In breaking up old concrete pavement, the contractor removed a segment from the side of the road left open to travel. Passage of vehicles over the spot gradually deepened the depression, and when the front wheels of a car, driven only about 10 miles an hour, dropped into the hole, an occupant of the car was thrown forward and injured.

The court decided that the action of the state highway department in posting flagmen to warn travelers against rough condition of the road ahead did not relieve the contractor of duty "to maintain the road in such condition as to make travel safe at the slow rate of speed at which travelers were required to travel". The court further declared that the contractor's liability in this case arose not out of his contract but rather from the duty imposed upon all members of the public not to render a public road unsafe for travel.

When Is "On Duty"?

Workmen's compensation acts provide for awards only for such injuries as are sustained in the "course of employment". Just as it is difficult to say just when night ends and day begins, it is often difficult to say when a worker is off duty.

Take the case of Cherewick v. Morris G. Laramie & Son, 295 N. W. 268, decided by the Michigan Supreme Court. An excavating shovel operator had completed one job and was on his way to another 12 miles away, but detoured to his home to eat a box lunch which he had carried with him. Then he put a kit of tools used in his work in his car and started for the site of the new job. On his way through traffic he was fatally injured in a collision at a street intersection. His widow was denied an award under the Michigan Workmen's Compensation Act, on the ground that the accident did not occur in the course of his employment.

Refusing to adopt argument that "the operation of the shovel, loading it and traveling to the new location to unload was all continuous and in the course of employment," the Supreme Court said: "Mr. Cherewick, at the time of the accident, was going to work and the case is no different than had he been on his way, in the morning, to resume work."

Protecting the Public

Old Man Law has gotten the notion in his noodle that where fresh concrete has been laid in a street or sidewalk it is just as important to protect travelers from injury as it is important to the contractor to guard against footprints being made in the green concrete. So the contractor is apt to stumble into a lawsuit if he fails to use reasonable care to safeguard pedestrians and other wayfarers.

In repairing a sidewalk in Pittsburgh, a contractor laid patches of concrete. To guard against pedestrians leaving their "trade-marks" in the concrete before it had time to set, boards with bricks under them were laid across the sidewalk to protect the concrete. In the ensuing night time a woman stumbled over one of these boards and was injured. The contractor was held liable because he had failed to provide a light or other warning at the place. The Pennsylvania Superior Court said:

"It is apparent that from common knowledge, and much more so from the defendant's experience as a concrete contractor, he should have foreseen the danger of placing an obstruction on the pavement and allowing it to remain in the path of pedestrians after dark without lights or other warning." (Bastl v. Papale, 15 Atl. 2d, 476.)

It is perfectly obvious that what the court says of obstructions left on sidewalks to protect an unfinished job is equally applicable to street or highway paving jobs, etc. In fact, more serious accidents are apt to happen to motorists who drive their cars into obstructions than to a pedestrian.

It's easy to do your metal construction work quicker, better and more economically . . . exclusive operation features of Hobart "Simplified" Arc Welder let you save time, labor and money. Repair equipment right on the job with a Hobart Gas Drive Welder and eliminate costly delays waiting for new parts. It's built to operate continuously, delivering the high quality welds that mean greater profit. Write for complete details.

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GOHI Pipe meets Copper-Bearing Pure Iron requirements in all specifications published by nationally recognized specifying authorities.

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C. & E. M. Photo
A general view showing the washing plant in the background.

Preparing Aggregate For Naval Air Base

(*Continued from page* 13)

uncrushed gravel to the top of the washing plant. The material was discharged into a launder sluice box where the first water was applied, sluicing the material into a 60-inch diameter by 18-foot long Telsmith heavy-duty washing screen. The first 4 feet of the main barrel was a blank metal scrubber with inside fins followed by a 6-foot perforated scrubber with ¾-inch perforations and 8 feet of 1⅜-inch perforations. Both perforated scrubber and the 1⅜-inch screen sections were fitted with lifting blades for thoroughly reducing soft stone in the aggregate. A 12-foot sand jacket with ¼-inch square openings around the main barrel screened out the sand, being made extra long to collect any particles of soft stone broken up during travel through the screen. All material through the 1⅜-inch perforations and retained on the sand jacket was delivered to the chute for 1-inch stone at the end of the jacket, while all material retained on the 1⅜-inch perforations went to a second chute for 2-inch stone.

Water for washing was provided by a Gould 10-inch centrifugal pump driven by a 75-hp General Electric motor. An electric-driven priming pump was provided to speed up the starting of the larger pump. The water was taken from a brook adjacent to the pit and delivered to the washing screen through a 4-inch pipe shooting heavy streams of water down at about a 45-degree angle.

The sand from the sand jacket was gathered into a hopper with a divided chute delivering it to two Telsmith sand drags, one a 48-inch x 24-foot unit and the other a 36-inch x 20-foot unit. The larger drag was operated through a chain drive from a 5-hp Master gear motor, and the smaller one similarly from a 3-hp gear motor. The sand drag operated as a dewatering and cleaning process, with the clean sand being scraped out at the upper end and the dirty water being discharged at the lower end and taken away from the plant by a long sluice.

Two gravel bins beneath the chutes mentioned had a capacity of 60 tons each and the sand was delivered to a stockpile beside the plant where it was moved by a bulldozer toward the ¾-yard Link-Belt Speeder shovel which loaded the material into trucks for hauling to the Station. The International T14 tractor was equipped with a Bucyrus-Erie bulldozer and operated continuously in wet sand.

Features of Plant

The entire plant from the feed hopper to the head of the main finished-product belt, which was 135 feet 6 inches long, was in a straight line while the washing plant was at approximately right angles to the remainder of the plant. The main switch house was located adjacent to the crushers and contained the master switches and meters for incoming electric current. Each piece of equipment, except the pump and washing plant, was started independently from a control house at the center of the plant. In starting the plant the 10-inch centrifugal pump was started first, then the crushers, then the washing plant, followed by the vibrating screens, rotary grizzly and then the belts, and last of all the feeder.

Delivery

Inasmuch as the hourly production of the plant was far beyond the capacity of the gravel bins, it was necessary to keep a fleet of twelve to fifteen trucks, divided about equally between the handling of sand and gravel, to haul the material away to the Station. Each load was weighed on the Fairbanks platform scales at the plant by an employee of the Boston Sand & Gravel Co., and checked by a representative of George A. Fuller Co. and Merritt-Chapman & Scott Co., the associated contractors for the construction of the Naval Air Station. The material was again checked before it was put onto the stockpile, both by the contractor and by a Navy Inspector for gradation to be certain that no load was dumped on the wrong stockpile.

An interesting operating problem developed at the scales which were installed in a tight concrete pit. Inasmuch as the land around the plant was quite level and the ground water was high it was impossible to put in a French drain from the pit, or a dry sump. Consequently, the hauling of wet gravel from the bins with such rapidity made it necessary to pump out the pit about twice each working day of 23 hours. This was done with a Jaeger 2-inch Sure-Prime pump which quickly unwatered the pit.

This new plant was rated by the designers at 150 tons per hour, but it regularly produced 250 tons of aggregates per hour during the period of its operation. Its average production of the Navy specification 1-inch and 2-inch aggregate and concrete sand was around 200 tons per hour for 24 hours a day. During the winter of 1940-41, the plant was operated 20 hours a day and produced 4,000 tons per day in temperatures as low as 16 degrees Fahrenheit.

Personnel

This new Telsmith sand and gravel crushing, screening and washing plant was designed for the Boston Sand & Gravel Co. of Cambridge, Mass., jointly by D. D. Reynolds, Secretary of the company, and L. D. H. Anderson of Anderson Engineering Co., Cambridge, Mass., the New England representative of Smith Engineering Works, Milwaukee, Wis. The plant was operated under the direction of Mr. Reynolds by James E. Moore as Superintendent.

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They say, "We have never found a lubricant that would begin to compare with LUBRIPLATE No. 30 for application on tractors and other construction machinery. On a recent highway job, with seven of our "Cats" in service, LUBRIPLATE showed real efficiency in transmissions, final drives and track rolls. We are pleased to recommend it."

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Do it FASTER -- for LESS!

Precision CRANE WORK moves faster with hi-speed MICHIGAN Air Controls. Heavy loads handled safely — Low Gravity Center for Stability; Heavy Duty Motors for power with economy. . . . Your request will bring MICHIGAN'S Work Book C, showing convertible MICHIGAN Mobile CRANES in action. Write for it today!

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You've saved *two million lives* ... so far!

SINCE 1907, when the fight began, the tuberculosis death rate has been reduced 75%!—by people like you buying Christmas Seals. More than two million lives have been saved.

But the battle against this scourge must go on. *Tuberculosis still kills more people between the ages of 15 and 45 than any other disease.*

Yet it is possible to eliminate completely this enemy of mankind. Our weapons are Research, Education, Prevention, Control—made possible by your use of Christmas Seals. Get them today.

Buy CHRISTMAS SEALS

New Gatke clutch facings.

Modern Clutch Facings

Improved asbestos clutch facings covering the complete range of industrial and automotive service requirements have recently been announced by the Gatke Corp., 224 No. LaSalle St., Chicago, Ill. Made of different material combinations and by various methods of processing to meet operating conditions, these clutch facings are furnished in sizes from 14 feet in diameter, weighing 1,000 pounds or more, to tiny disks weighing less than an ounce. Geared-tooth clutch facings with integrally moulded teeth and cone-type clutch facings, as well as the conventional disk-type, are available in all shapes and sizes.

Further details on these Gatke clutch facings and their application in the construction field on all types of automotive equipment may be secured direct from the manufacturer.

Asphalt Construction Specifications Revised

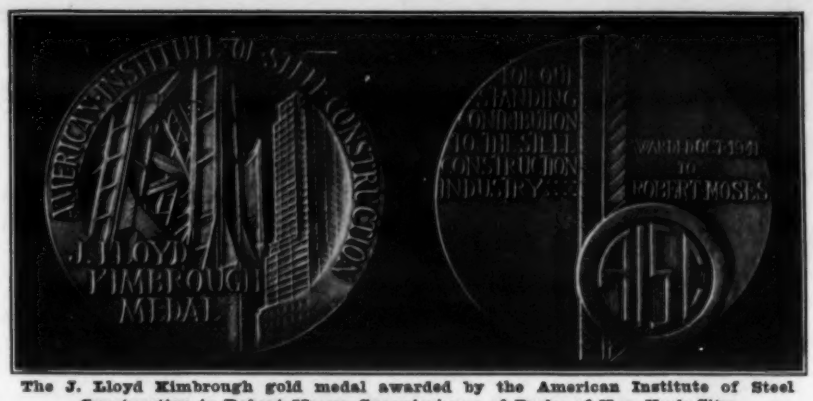
Three newly revised Asphalt Construction Specifications, superseding the revisions of May 15, 1934, have just been issued by The Asphalt Institute. These include RM-1, Specification for Asphaltic Road-Mix Surface Course (Macadam Aggregate Type); RM-2, Specification for Asphaltic Road-Mix Surface Course (Dense Graded Aggregate Type); and S-1, Specification for Asphalt Surface Treatment or Retreatment of Old Bituminous Surfaces.

The changes made in these specifications were of a minor nature to make them conform to present-day practice, and also to incorporate the latest revisions of cut-back asphalt specifications.

Single copies of these Specifications are available without charge upon request to The Asphalt Institute, 801 Second Avenue, New York City.

Steel Constructors Honor Robert Moses

The American Institute of Steel Construction, which represents 90 per cent of the fabricating capacity of the United States, has long been known for its annual awards for the most attractive steel bridges erected in the United States and for its annual competition open to engineering and architectural students for the best design for a specific type of steel bridge. It has now established a new fundamental award which is reserved for special distinction and will not necessarily be made periodically. The Committee on Medals and Awards of the Institute is to make a survey at least once a year to determine whether, in the judgment of the Committee, persons are available for consideration who through engineering and public service efforts have promoted the usefulness of steel in engineering and civic projects.


AMERICAN INSTITUTE OF STEEL CONSTRUCTION
J. LLOYD KIMBROUGH MEDAL
FOR OUTSTANDING CONTRIBUTION TO THE STEEL CONSTRUCTION INDUSTRY
AISC

The J. Lloyd Kimbrough gold medal awarded by the American Institute of Steel Construction to Robert Moses, Commissioner of Parks of New York City.

The first award of the J. Lloyd Kimbrough gold medal, named for the founder of the Institute and its first President, holding office for seven years, was made on October 16, 1941, to the Honorable Robert Moses, Commissioner of Parks for New York City, for his dynamic expansion of the park systems of New York City and the solution of complicated traffic problems through the construction of the great Triborough and Whitestone Bridges, numerous grade-crossing elimination projects, the Belt Parkway on Long Island, and numerous other civic projects. The award was made at the annual convention of the American Institute of Steel Construction at White Sulphur Springs, Virginia.

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YOU don't throw good money down the sewer!

Nor would you knowingly use any piece of equipment that is costing you—day after day—an excessive amount of money for repairs. A contractor volunteers the report that his Cleveland Drill Rigs are showing 41% less in repairs than other wagon drills working on the same job. That seems like a big difference in upkeep cost, and, frankly, we wouldn't expect to find so much saving on every drilling job. However, there are undoubted savings in the operation of a Cleveland Drill Rig, but the only way to determine the advantage to you is to try a Cleveland on your own work, with your own operator. Simply give us the word. We will demonstrate whenever and wherever you say. Surprising deliveries, for these trying times.

Did You Get Your Copy?

The Fourth Edition of the DRILLER'S HANDBOOK is now ready for distribution. Replete with ideas on getting more work out of your drills, paving breakers, and other types of pneumatic tools—full of suggestions that will enable you to save money on operating air equipment—this book will be sent FREE to those who write, giving us the type and make of rock drills, or other pneumatic machines, being used on your job. Price to applicants not furnishing this information is $1.00 per copy. Don't wait till our supply is exhausted!

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Catalog on V-Type Plows For Mounting on Trucks

Carl H. Frink, Clayton, New York, has recently issued a new and complete catalog covering its V-type Sno-Plows, leveling wings, power hydraulic control, and Sno-Plow attachments, such as the Frink hand hydraulic lifting device, the front-frame type of push frame assembly and the combination front frame and axle-type push frame assembly. All types and sizes are illustrated and described, information is given on how to select the proper Sno-Plow for your truck and special Frink features are presented.

Copies of this catalog, No. 39D, may be obtained by writing direct to the manufacturer and mentioning this item.

Solution-Lifting Steam Guns Described in New Bulletin

Steam cleaning is an economical and practical method of removing dirt, grease, grime and similar deposits from equipment of practically every type. Steam cleaning with Oakite steam guns is the projection of a high velocity spray of steam and the recommended Oakite solution, bringing to the surfaces to be cleaned a balanced combination of heat, detergent action and mechanical force to loosen and remove the grease and dirt deposits.

Oakite Products, Inc., 22 Thames St., New York City, makes two models of solution-lifting steam guns, Nos. 384 and 385. The smaller gun, Model No. 384, is equipped with two sizes of nozzles and suction orifices to provide smaller or larger quantities of cleaning solution, according to the steam capacity available. The larger gun has only one nozzle because it is designed for use only where an ample steam supply exists.

Complete information on this Oakite method of cleaning and the steam guns is contained in a folder, copies of which may be obtained by writing direct to the manufacturer and mentioning this item.

Marion Office Moves

The St. Louis, Mo., office of the Marion Steam Shovel Co. has moved to the Ambassador Building, 411 North 7th St. Kenneth H. Winter is District Manager.

YELLOW CAB FLEET SAVES 2 MILES PER GALLON

Two miles more per gallon . . . 50,000 miles between overhauls . . . an 18% reduction in maintenance costs . . . any one of these savings would have cut a big slice from fleet operating costs. But the Danville, Illinois Yellow Cab Company made all three, when a Standard Oil Automotive Engineer finished helping this fleet's maintenance men with their problems.

Taxi service is tough on engines—but with sludged motors, sticking rings, and poor gasoline mileage, the fleet maintenance foreman was convinced he had more than his share of troubles. He welcomed the chance to tell them to a Standard Oil Engineer.

As a result of the tests the Engineer made, and his recommendations of the right Standard Oil fuel and motor oil, sludging and ring sticking were entirely overcome and gasoline mileage increased from 10 to 12 miles per gallon.

GETS 11 MILES PER GALLON ON DELIVERY SERVICE

Accurate fleet records and the help of a Standard Oil Automotive Engineer are two reasons why this Mason City, Iowa, fleet gets this high gasoline mileage even on heavy delivery service.

Here's the system. The fleet maintenance man keeps a close watch on the efficiency of his equipment. Any unusual increase in maintenance or gasoline or oil consumption is investigated by the Automotive Engineer. His instruments soon tell him where the trouble lies, and the maintenance department corrects it.

It's as simple as that, but it works. It not only increases gasoline efficiency, but it saves maintenance time and reduces breakdowns and road failures. You can get this same Engineering Service at no cost to you if your fleet is located in the Middle West.

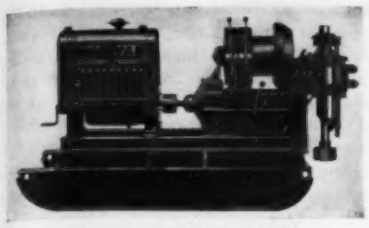
TRACK ROLLER COSTS REDUCED FOR IOWA CONTRACTOR

Gasoline economy is the first interest of a Standard Oil Automotive Engineer, but it's just one of the problems they can solve for you. For example, one of these Engineers, working on a consumption problem in an Iowa contractor's fleet, learned that track roller maintenance costs were high. He recommended a test of Standard Viscous Track Roller Lubricant. The contractor estimates that this recommendation has cut roller maintenance 40% to 50%.

If you operate gasoline or Diesel powered equipment in the Middle West, one of these Engineers is near you, ready to help your maintenance department cut every excess dollar from your operating costs. Write the nearest Standard Oil Company (Indiana) office or 910 South Michigan Ave., Chicago, Ill., and ask to have one of these Engineers explain how he works and just what he does. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

STANDARD OIL COMPANY (INDIANA)

AUTOMOTIVE ENGINEERING SERVICE LOWERS MILEAGE COSTS



The No. 22-HD core drill.

New Core Drill

A new heavy-duty core drill, No. 22-HD, has recently been announced by the Sullivan Machinery Co., Michigan City, Ind. This new drill is built for surface drilling under the toughest operating conditions, the manufacturer states, and is conservatively rated at 1,750-foot capacity with E rods.

The No. 22-HD is a direct-drive machine with the power unit connected to the drilling head through the four-speed automotive-type transmission by means of a clutch which allows the use of any power unit having a stub shaft, either gasoline, electric or diesel, if operating characteristics are suitable. The controls are conveniently grouped, all gears are enclosed, and a hand-lever safety clutch permits the runner to stop the rotation of the beveled drive gear when the swivel-head is open while running or pulling rods. The swivel head, large hoisting drum, transmission, clutch and power unit are mounted on a rigid skid base. The unit can be quickly dismantled into four main parts for mule-back transportation, if necessary.

Copies of Bulletin D-28 describing this new core drill in greater detail may be secured direct from the manufacturer.

Two New Electrodes

Two new types of welding electrodes called Harmomang A and Harmomang B, for use in building up and reinforcing 11-14 per cent manganese steel or carbon steels where high resistance to impact and abrasion are desired, have recently been announced by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

Type A is a coated manganese-molybdenum electrode on which the thin coating acts as an arc stabilizer and affords protection again loss of manganese and molybdenum. Type B is a bare manganese-molybdenum electrode, providing an austenitic deposit. Both of these electrodes are suggested for such work as building up dipper lips and runners, hammermill parts, dredge pump shells, rock crusher parts, road grading and dirt-moving equipment, and similar service.

Complete information on the physical properties, applications and procedures in the use of these two new electrodes may be secured direct from the manufacturer or from this magazine.

New Folders Describe Earth-Moving Units

Designs, features and applications of the new Tournapull, made by R. G. LeTourneau, Inc., Peoria, Ill., are graphically illustrated in two new booklets recently released by this company. Catalog TP-104 is printed in four colors and contains 12 pages of facts and illustrations on the Models C and Super C Tournapull. Two full pages have been devoted to a cross section view of the Tournapull, showing every part which gives it high-speed operation. Specifications are also included.

Catalog TR-102 presents universal applications of Tournapulls on all forms of earth-moving and construction projects. It is packed full of actual job photos picturing Tournapull methods and applications used by well-known contractors throughout the country.

Copies of these booklets may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Minnesota BUYS 84 MORE HIGHWAY EQUIPMENT COMPANY SAND and CINDER SPREADERS

This brings the total to 160 purchased by the Minnesota State Highway Department in less than one year.

Many State Highway Departments, Cities, Counties, City Bus Lines, as well as Government Airports, Munition Plants, etc., are solving their ice problem with the new and improved Highway Spreader.

Now a motor-driven spreader that will spread uniformly at speeds from one to forty-five miles an hour and spreads material under the rear wheels of the truck, permitting it to travel up or down icy hills with ease in forward motion.

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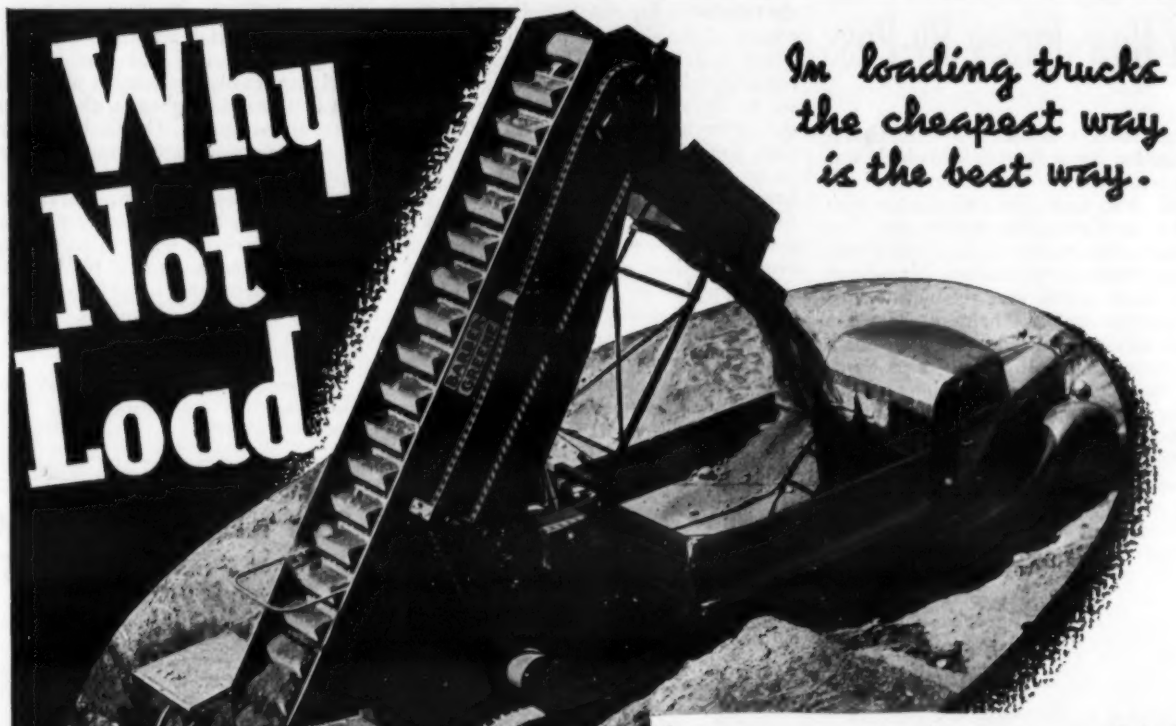

Im loading trucks the cheapest way is the best way.

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Barber-Greene Bucket Loaders have been checked against every other method of loading trucks. They have never failed to show substantial savings. They invariably use less power, require less skill. They save truck time, man time, job time. Their versatility makes them useful the year 'round for all types of loading, stripping, light excavating, and unloading cars. They are available with gravity, shaker or high capacity vibrating screens.

The mechanical design and exclusive features of the Barber-Greene place it way ahead in quality, dependability, and ease of operation.

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C. & E. M. Photo
One of the Mack 6-batch trucks used by LaFera-Grecco Contracting Co.

Laying Concrete Paving On New Jersey By-Pass

(*Continued from page 29*)

ramps, using a Model F 13-yard Carryall pulled by a D8 tractor which was also equipped with a LeTourneau bulldozer. The final grade was made with a No. 20 Caterpillar grader and five laborers. The grader worked both ahead of, and between, the 10-inch Blaw-Knox steel forms which were set by one boss form setter and two helpers. The five grade men worked with a single scratch board and were followed up by a Fordson 3-ton roller. On all sections a hand roller was used for compacting the final grade.

The design of this highway was changed slightly after the initial contract was signed, due to the experience of New Jersey last winter with ice on its highways. In order to remedy this condition, it was proposed to dish the center island and crown each traffic lane and provide inlets to receive the run-off along the center of the road.

Pouring and Completing the Slab

On most of this work the paver was run outside of the forms but there were so many variations caused by the approach ramps and the necessity of handling traffic that the paver was run between the forms at times. This naturally caused some damage to the subgrade and also prevented the placing of the expansion joints ahead of the paver. The New Jersey expansion joint is an assembled unit so these were laid outside the forms and placed as required when the paver passed. Any marring of the very uniform subgrade by the batch trucks or the paver was carefully smoothed out by the same man who sprinkled the subgrade, using a hand lute.

The paving crew consisted of the very busy man releasing the batches from the 6-batch trucks, the paver operator, and three expert pit men. With the speed at which this job was run, averaging 1,200 square yards of 10-inch pavement in 9 hours, the three pit men were exceedingly busy individuals, keeping the concrete well spread between the forms. All concrete was vibrated on both sides against the forms and across both sides of all expansion joints, using a Viber vibrator with a Dale & Rankin power plant. Water for the paver was taken from hydrants along the right-of-way or located on nearby streets.

Two methods of strike-off and finishing were used because of the nature of the work. On straightaway, or what might be termed normal paving, a Blaw-Knox mechanical finisher with hydraulic lifts for the screeds, and adjustable to work up to 15-foot widths, was used. On ramps and approach slabs of varying widths, hand strike-off and screeding were used. Two men operated the hand strike-off, which was unusual but which was due to the excellent spreading by the pit men, and were followed by six men operating the hand screed.

Three men took care of all the hand finishing, first, using a long handled float, then checking with a 10-foot aluminum straight-edge, following which the surface was dragged with an 18-foot x 30-inch denim drag, and then the transverse brooming, ending with the edging of the slab. Each slab was numbered and lettered. The numbers ran consecutively from the beginning of paving to the end and the letter indicated the paver used for the work. The last slab poured each day was also dated. Instead of the old method of using any handy nail or wire to scratch the information on the surface of the green concrete, this contractor has a set of bronze numbers and letters which were first dipped in oil and then pressed into the concrete, giving a neat and permanent record. The caps on the expansion joints were pulled by the finishers who also edged along the sides of the joints. Expansion joints are spaced uniformly 56 feet 4 inches apart and are the standard bar dowel New Jersey specification joint.

The slab was cured by spraying with asphalt emulsion after the man who did the spraying had cleaned any excess concrete from the top of the longitudinal joint between slabs. The spraying outfit was a standard Aeroil unit altered so that the air was delivered direct to a heavy steel gasoline drum containing the emulsion which was thus delivered under pressure to the nozzle. The contractor has found this much more satisfactory than other methods.

New Jersey design uses an 18-inch thick bridge approach slab for 25 feet from the bridge, then reducing uniformly in 6 feet to the thickness of the slab, namely, 10 inches.

Servicing the Job

The tied bar mats were made up on a standard wooden frame on the job and then moved by a 3-ton flat-bed Brockway truck to piles along the subgrade from which they were distributed later as the paver approached. The reinforcing weighed 78 pounds per 100 square feet of slab.

In order to prevent water gaining access to the subgrade from the surface through the longitudinal joint between slabs, and without placing entire reliance in the asphalt seal at the top, New Jersey requires a metal interlocking waterproof strip. On the initial slab poured, the interlocking strip is vertical and was cast in against the form. To keep this from being damaged in opening it up to receive the section that slips over it, J. M. Napp of LaFera-Grecco developed a simple tool to replace the old screw driver. This tool is a slightly tapered disk about 10 inches in diameter on a 3-foot handle. The disk was inserted between the slab and the waterproof strip at one point, and then pushed ahead very easily, opening it up a uniform distance throughout without damage to its continuity. The slight amount of grout adhering to the outside of the strip readily fell off when the strip was tapped after this operation. During the edging of the second slab over this waterproofing strip a ½ x ¾-inch strip of wood was inserted to aid the finisher in edging. Before the joint was poured this strip was removed and all concrete above the waterproofing strip removed wtih a steel broom.

As a means of making the job run more smoothly one utility man was maintained to pick up all pins removed from expansion joints, as well as those used for holding the steel road forms, tools and other miscellaneous items, putting them on the concrete where they would readily be seen and gathered up by the International pick-up truck which also carried a supply of gas and oil for the equipment and was used to run the numerous errands necessary on a job of this type.

One of the most useful time and money-saving pieces of equipment on the job, particularly when pouring ramps which required that the paver be moved frequently, was a 50-ton equipment trailer. In less than 10 minutes from the time the paver dropped its last batch at one ramp, or location, the paver hose was reeled up and put in the skip and the paver quickly run up onto the trailer and was moving to the next location, towed by a heavy-duty Mack truck.

Sidewalk Paving

All sidewalk and reflecting curb on this job were done by Peter Frapaul of Hackensack, N. J. The sidewalk varied from 4 to 5 feet wide and was uniformly 4 inches thick, poured in one course.

(*Concluded on next page*)

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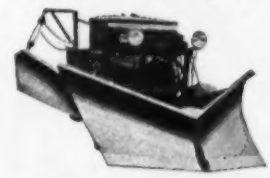

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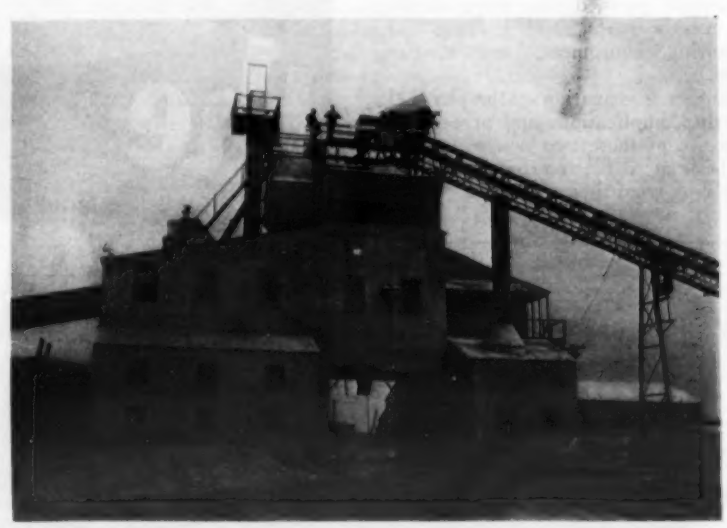

Costing $70,000,000, the Elwood shell-loading plant and the adjoining Kankakee TNT plant are important parts of the defense effort. Since speed and efficiency were essential, it was natural that the U. S. Transit-Mix Concrete Company should turn to Butler to supply the concrete plant to serve these two vital projects. The results were more than gratifying.

The plant consisted of a 150-cu. yd. three-compartment aggregate bin fed by a belt conveyor, a two-compartment auxiliary cement hopper attached to the side of the aggregate bin, and a 100-cu. yd. two-compartment cement storage bin. Water was weighed automatically and discharged by hand, while the sand, stone, and cement were weighed and discharged manually in a 5-yard Agra-cement batcher. A batcher operator, a belt conveyor operator, a truck spotter, one cement car handler, and five men handling aggregate cars were the only personnel required.

Yet a daily run of 230 cu. yds. per hour was achieved! Forty-six batches per hour, with a 5-yard truckmixer leaving the plant every eighty seconds, attest to the ease of operation of the plant. Let Butler engineers show you how to plan *your* plant efficiently and inexpensively. No matter what your job, consult Butler today.

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C. & E. M. Photo
Precast reflecting curb on the La-Fera-Grecco concrete paving contract on the Paterson, N. J., by-pass.

Reflecting Curb Used On New Jersey Road

(Continued from preceding page)

The contractor used a Koehring Dandie 3-bag mixer and weighed all aggregates on a Fairbanks wheelbarrow scale. The subgrade was compacted with a hand roller and the concrete poured between steel forms.

Reflecting Curb

The contract called for the placing of 28,828 feet of precast sloping reflecting curb, 2,992 feet of cast-in-place white vertical curb 7 inches x 20 inches, 678 feet of 24-inch precast reflecting curb, 1,140 feet of 2-way sloping reflecting curb, and 36,199 feet of reflecting white vertical curb. All of the work on curb was done by Peter Frapaul, with the curb cast-in-place being poured between the steel forms with the special die-cast face on the inner form to give the varying reflecting angles which are a feature of the latest design of New Jersey reflecting curb. The various types of reflecting curb were used on both sides of the medial strip, which varied from 6 to 16 feet wide, and on the outside of both roadways. The curb against the medial strip was all precast by the Multiplex Concrete Co., Inc., of East Orange, N. J.

Major Quantities

The major quantities involved in the original contract which was awarded on the bid of exactly $538,800.00, including the one concrete bridge, are as follows:

Roadway excavation, unclassified, for ramps	17,622	cubic yards
Top soiling and seeding, 4 inches thick	19,654	square yards
Top soiling and seeding, 6 inches thick	22,296	square yards
Fertilising and seeding	5,600	square yards
Cast-in-plate white vertical curb, 7 x 20 inches	2,992	feet
Precast reflecting curb, sloping	28,828	feet
Precast reflecting curb, 24-inch	678	feet
Precast reflecting curb, 2-way sloping	1,140	feet
Reflecting white vertical curb	36,199	feet
Concrete sidewalk, 4 inches thick	49,210	square feet
Vitrified clay pipe, 6-inch, sanitary sewer	2,540	feet
Vitrified clay pipe, 8-inch, sanitary sewer	524	feet
Reinforced concrete pipe, 18-inch	4,017	feet
Reinforced concrete pipe, 24-inch	410	feet
Cast iron pipe, 8-inch	38	feet
Cast iron pipe, culvert, 12-inch	30	feet
Cast iron pipe, culvert, 18-inch	308	feet
Reinforced concrete wall	1,233	cubic yards
Concrete pavement, 10-inch slab	114,366	square yards
Subgrade	116,359	square yards
Bridge approach slabs, 18-inch	1,993	square yards
Concrete driveways, 6-inch	62	square yards
Concrete island pavement	827	square yards
Wire rope guard rail	4,900	feet
Pipe railing	3,000	feet

Personnel

The contract for the 3.131 miles of grading and paving on the Paterson by-pass, New Jersey Route 6, was awarded to LaFera-Grecco Contracting Co. of Newark, N. J. The work was carried on under the direction of J. M. Napp, a member of the firm. For the New Jersey State Highway Department the work was done under the direction of C. A. Burn, District Engineer, Northern District, with F. E. Beck as Resident Engineer. The contract was designated as Sections 8A and 8B on New Jersey Route 6 extending from Lexington Avenue to Valley Road in Clifton, Passaic County, N. J.

New Electric Welder

For use in welding light-gage metal, castings and drive shafts, and in general maintenance work, a new Flexarc welder has been announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna. Known as the Midget Marvel WT-1, this a-c welder comes complete with all accessories, including the primary cable for hooking up to the power line, electrode lead and holder, work lead, helmet, and electrodes.

Sensitive adjustment of the welding current over a range from 20 to 140 amperes is provided by fifteen steps with correctly proportioned increments between steps. Full load rating is 100 amperes, 30 minutes, 30 load volts, when used on 220-volt 60-cycle lines. The unit is very compact, being 14½ x 12⅛ x 20 inches in size and weighing only 160 pounds. To facilitate mobility, it is mounted on casters.

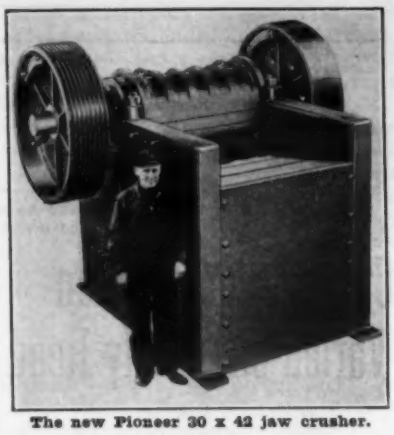
New Bulletin Describes Heavy Duty Trenchers

The 200 Series heavy-duty trenchers, the "biggest bruisers" of them all, are described in Bulletin No. 7B-200 recently issued by the Buckeye Traction Ditcher Co., Findlay, Ohio. A feature of these machines are the Buckeye patented rotary auxiliary side cutters enabling them to cut trench wider than that cut by the buckets, greatly broadening their digging range. The Model 201 cuts trench 15 feet deep and 24 inches to 40 inches wide, using the buckets alone, and 60 inches wide, using buckets and the auxiliary side cutters. Model 203 cuts trench 18 feet deep and up to 72 inches wide and Model 260 24 feet deep and 144 inches wide, using side cutters. Other features, according to the manufacturer, are rugged transmissions, simplified controls, nonclogging crawlers and self-cleaning buckets.

New Booklet on Wire Rope For Construction Equipment

"Helping Speed Construction" is the title of an informative booklet recently issued by the Hazard Wire Rope Div., American Chain & Cable Co., Inc., Wilkes-Barre, Penna., which should prove of value to owners and operators of construction equipment, since it is largely a book of specifications showing exactly the wire rope to use on all parts of principal machines. The booklet is well illustrated and contains information on Hazard Nonparel and Hazard Lay-Set preformed wire rope.

Copies of this booklet may be obtained by writing direct to the manufacturer and mentioning this item.



The new Pioneer 30 x 42 jaw crusher.

New Size and Style Feature Jaw Crusher

The 30 x 42-inch primary jaw crusher recently announced by Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn., is new in several respects, according to the manufacturer. It is a new size; it is new in style, streamlined with new lines and a smooth exterior surface; and it is new in construction, with a welded steel base and an overhead eccentric.

It is stated that modern materials, design and construction have saved more than 50 per cent in the weight of this crusher. Other features include SKF self-aligning spherical roller bearings, manganese steel jaws, worm and gear adjusting mechanism, and the overhead eccentric which is new in this size of crusher.

Further information on this new Pioneer primary crusher may be secured by interested contractors and engineers direct from the manufacturer.

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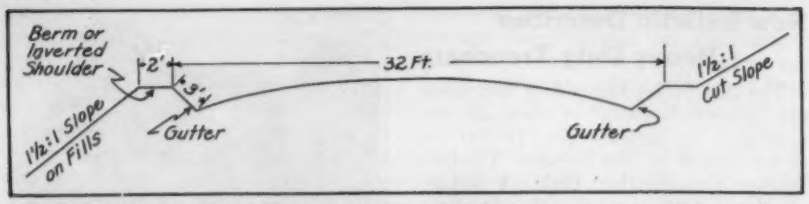

Typical section in cut and fill on the Angeles Forest Highway, showing slopes, gutter and inverted shoulder.

Culvert Construction Varied on County Road

(*Continued from page* 11)

Tujunga watershed in five days.

One method of handling heavy roadway run-off is by inverting the shoulders. It is believed that Los Angeles County engineers were the first to employ this method. Instead of sloping the shoulders outward to carry off the water, they are sloped toward the pavement so that the highway at times serves as a stream channel. The reason for this unusual procedure is to prevent the erosion of unprotected slopes below by carrying the water to gulches or paved spillways.

On the steepest grades, paved gutters were built alongside the roadway to carry the water to culverts and spillways. These gutters are of rubble masonry construction. Small stones of various sizes were used, mostly 6 to 12 inches in diameter, laid in cement mortar of a 3 to 1 mix, giving a fairly smooth surface.

Water is carried along the roadway, in the gutters on either side, to points where it can be discharged into culverts on the upper side or embankment drains on the lower side of the highway. The latter are quite deep, being constructed for the purpose of protecting the embankment from erosion by carrying the water down to its bottom.

Embankment drains, or spillways, are built of rubble masonry with stones up to one cubic foot in size, the largest one man can handle without equipment. These drains vary greatly in length, width and depth, depending on local conditions. Most of them are 5 to 10 feet wide, with some up to 20 feet.

Slides present a very difficult mountain-road problem. If the cuts are too steep, the material is likely to break away and slide into the road area, while if the slopes are too flat they catch and store the rain instead of permitting it to run off over the surface, and the ponded water beneath the surface may loosen the bank and start a slide.

When a cut is made across a narrow spur some distance back from the end, there is danger of slides filling the road and cutting off traffic until power equipment can be brought up to clear away the debris. In cases of this type, the outer section of the spur was removed and the highway width doubled or trebled so that when and if slides do occur the highway will not be put out of commission.

In order to check erosion, desert willows (baccharis) were planted thickly on the steep slopes of fills where there was sufficient soil to sustain plant life. At the beginning of the rainy season yard-long cuttings were pushed into the ground, where they quickly rooted and helped bind the slope. During the past two years many pines and sycamores also have been planted in such places, for ornamentation and erosion control.

Culvert Construction

Data for the necessary calculations for the size of culverts on this project, determined by the watershed area of the streams to be carried, the steepness of the terrain and the maximum storm precipitation, were obtained from the Los Angeles County Flood Control Commission and Angeles Forest Service.

All culverts are placed high above the streambed in order to create large catch basins for water-borne rock and debris on the upstream side of the road. Flood debris collects in these basins instead of clogging the culverts.

The culverts vary from 18 inches to 10 feet in diameter and from 40 to 200 feet in length. All are made of corrugated steel pipe except the one at Lucas Creek, which is rubble masonry. This huge hand-made structure is 80 feet long and consists of a parabolic arch 7 feet high above an 8-foot 6-inch vertical-side section, 12 feet wide and paved with an 18-inch concrete slab.

Forms for the culvert consisted of 3 x 8 uprights crossbraced, carrying shaped sections of 2 x 6's gusseted together and covered with 2 x 3 form lumber laid lengthwise. As one portion of the structure was completed, this form was removed in sections and reassembled for an adjoining portion.

The rubble masonry begins 5 feet below the culvert floor and is 9 feet thick at the bottom, reducing to a thickness of 3 feet at the spring line and 2 feet at the top of the arch. To save scaffolding, 2-inch iron pipes, wrapped in oiled paper from dynamite sticks, were set in the culvert wall and heavy planks laid across the projecting portion. Because of the oiled paper, the pipes were easily withdrawn from the wall after they had served their purpose.

The stream bed below the culvert has been paved for 60 feet. High wing walls at either side of the structure at both upstream and downstream ends were built to support the fill.

Four thousand two hundred sacks of cement were used in building this culvert, including wing walls and spillway. Approximately 950 cubic yards of masonry went into the entire structure. All concrete was hand-mixed and carried in buckets for pouring. Stone was obtained from the creek bed and banks. No rocks too large for handling without equipment were used. A few, weighing up to 200 pounds, required two men to move, but most of the stones were small enough to be easily handled by one man. Spaces between boulders were filled with small stones. The fill is approximately 9 feet thick over the conduit.

When large culverts are built by free labor at current wages, it is more economical to use reinforced concrete, with concrete mixing and placing equipment. But when the labor is performed by prisoners at nominal wages, as is the case on Los Angeles County road work, it is less expensive to do the work by hand, which also provides a greater amount of work for the prisoners.

Prison Labor

Los Angeles County pioneered in the use of prison labor on highway work, keeping the prisoners in detention camps without fences or armed guards. These men do all the hand excavation, build retaining walls and gutters, plant trees and place brush mats to check erosion, and carry on many other jobs where skilled labor is not essential.

The county believes that since it must feed, clothe and house lawbreakers, whether they work or not, it is better both for them and the taxpayers for the prisoners to be usefully employed. Road work in remote areas offers the best solution to the problem.

The prisoners are paid 50 cents a day, besides their keep. Money earned by men serving time for non-support is sent to their dependents; others are given $3 a month and receive the balance of their wages upon completion of their sentence.

A resident engineer has general supervision of the activities of men working out of each camp, who number about 60 and who are in charge of a sergeant and three deputy sheriffs. Escapes are rare and the few men who get away are generally soon recaptured and sent to a state penitentiary to serve the balance of their sentence, plus an additional one for jail-breaking. The food is ample, varied and of good quality, and most

(*Concluded on next page*)

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Working on a second bench and end-dumping a 125,000-yard fill on the Angeles Forest Highway in California.

Building County Road Through Angeles Forest

(*Continued from preceding page*)

offenders prefer road work to prison life and seldom cause any trouble.

Care of Equipment

All power equipment is run by free skilled operators receiving standard union wages. The policy of the Los Angeles County Road Department is to operate various standard makes of machines for building and maintaining roads, buying those best adapted to particular jobs.

Dump trucks of unusual design, with special transmissions having 15 speeds forward and 6 in reverse. In making cuts on steep locations very low gear is needed for heavy pulling and several reverse speeds are required for hauling loads backwards. Much mountain grading is done in places too narrow for turning, therefore the trucks have to be backed from the loading point to the dumping locations. In the opinion of the Los Angeles County engineers, most reverse gears are too slow, which is the reason for the type of transmission used.

To guard against the danger of loaded trucks getting out of control while backing down a steep grade, an auxiliary air-brake control is placed on the left-hand side of the cab, within easy reach of the driver while operating the machine in reverse, so it can be stopped immediately.

Excessive wear on the truck beds from handling huge rocks is prevented by welding three small railroad rails, spaced equally from side to side, lengthwise on the bottom. Four-inch steel pipes are welded to the top of the bed on each side.

Among the trucks in use are Morelands which have been in service for many years, GMC's and two new Federals with 115-hp 6-cylinder engines and 5-yard bodies. Other equipment used by the Road Department on this work includes Schramm and Gardner-Denver air compressors, Caterpillar tractors with bulldozers, Adams graders, rooters, a Caterpillar-diesel-powered Koehring 1½-yard power shovel, a Thew-Lorain 1½-yard gasoline-powered unit, and a 1½-yard Lima powered by a 100-hp Waukesha gas engine.

Much heavy rock work makes bucket wear a big problem. On the front edge of the buckets of power shovels owned by the Los Angeles County Road Department, on both sides and other places where there is unusual wear, Stellite is applied by electric arc welders.

Exceptionally long wear for the steel cables on the shovels is obtained. Al Berglund, the Lima operator who has been operating shovels for 20 years, has used a 1⅛-inch cable for ten months and considers it good for two months more. He has found it important to saturate a cable thoroughly with grease before using it first, since the oil applied by the manufacturer may dry out before the cable is put to work. Equal portions of pinion and crankcase grease are mixed and warmed for the first liberal application to the cable, which is coiled and immersed in a steel drum partially filled with hot oil. Subsequent greasing is with transmission oil mixed with pinion grease to give it more body. Frequent and thorough greasing, together with changing ends after a few months' use, has been found to lengthen the life of a cable from one-third to one-half.

Paving

The finished highway is 32 feet wide. Because of the highly mineralized nature of the roadbed, surfacing with aggregate was unnecessary. When the roadway and shoulders were shaped to true cross-section, the surface of the road was loosened with a scarifier to a depth of 1½ inches, forming a loose, porous surface into which oil easily penetrated. This mulching operation was performed immediately before the first application of oil.

After the oil had penetrated sufficiently so that it would not adhere to pneumatic tires, a truck with dual rear tires was run over the roadway longitudinally until the whole surface was uniformly compacted. Trucks of various weights were employed for this purpose.

Regular asphaltic road oils were used, including the following: SC-1, a slow-curing oil with the lowest asphalt content, 30 to 35 per cent, 80 penetration; SC-1 with 40 to 45 per cent asphalt; SC-1A with 50 to 65 per cent asphalt; and SC-2 with 65 to 71 per cent asphalt.

The lighter oils, first applied for maximum penetration, were heated up to 100 degrees F., while the heavier oils used for final surfacing were spread at temperatures ranging up to 200 degrees. Four applications of oil were made. Because the new highway did not have to be finished as soon as possible, heavier oil was used and more time allowed for penetration than where a much-used highway is rebuilt or repaired and speedy completion required.

Work on the Angeles Forest Highway was started 12 years ago and completed this past summer. Heavy rains last winter and a flood three years ago caused considerable delay.

Personnel

O. F. Cooley is Los Angeles County Road Commissioner; E. A. Burt, Chief Deputy; Ralph Mills, Ray Reeser and William Winn, Resident Engineers; and J. A. Blickensderfer, Supervising Engineer in charge of road camps.

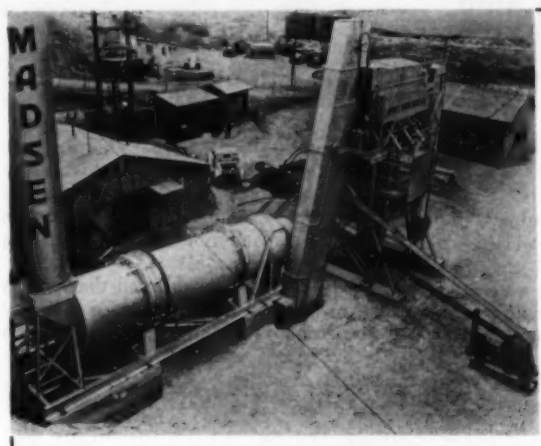
Pile Driver Increases Usefulness of Crane

A new rugged yet light lattice-type pile-driver attachment recently announced by the Buckeye Traction Ditcher Co., Findlay, Ohio, greatly increases the utility of the Buckeye Clipper crane, the manufacturer states. These pile-driver units are available with the Model 50 5-ton crane, the Model 60 6½-ton and the Model 70 7-ton machines, any of which will readily hoist wood or steel piles into position for driving. All three models are quickly convertible to shovel or trench hoe or can rapidly be reeved for clamshell or dragline operation.

The leads of the pile-driving unit are suspended from the boom point sheave shaft and are secured in such a way that they can be quickly unhooked. The leads or gibs are 30 feet long and of heavy channel steel construction. The drop hammer weighs 2,000 pounds, is quickly reeved and responds instantaneously to the vacuum power control by means of which it is operated, it is stated. An impact-resistant pile cap is designed to guide and protect wood pile being driven. Both pilot and hammer are readily transported by truck.

Further information on this new attachment for increasing the usefulness of Buckeye Clipper cranes may be secured direct from the manufacturer.

The 1942 Convention of the American Road Builders' Assn. will be held in Memphis the first week in March.



MADSEN Asphalt Plant

3000-lb. capacity 72"x24' dryer

The plant complete, including the hot stone elevator, Symons vibrating screen, dust elevator, dust screw, 3000-lb. twin-shaft pug mill mixer and asphalt gun, is driven by a 75-hp. motor. A 30-hp. motor drives the dryer.

Step Up on Production—Step Down on Maintenance!

MADSEN Asphalt Plant Equipment, always a leader and recently greatly improved in design by MADSEN Engineers, will enable you to step up your production and cut down your costs.

MADSEN's far simpler transmission arrangement handles from a single power source, if desired, the driving of all the component parts of the plant; this function being accomplished with fewer chain drives, fewer sprockets, fewer gears and less footage of line-shafting than any other plant built with a single power input.

Simplicity and sturdiness—these are the reasons why, ton for ton, MADSEN asphalt plant maintenance is lower than that of other makes.

MADSEN mixers have heavier wearing sections—built of superior materials and designed to take the wear where it is most severely imposed.

The new MADSEN asphalt gun is the greatest improvement in asphalt equipment in twenty years.

MADSEN plants are built in sizes ranging from 500 pounds to 6000 pounds per batch, assuring every contractor of suitable equipment for his own special production requirements.

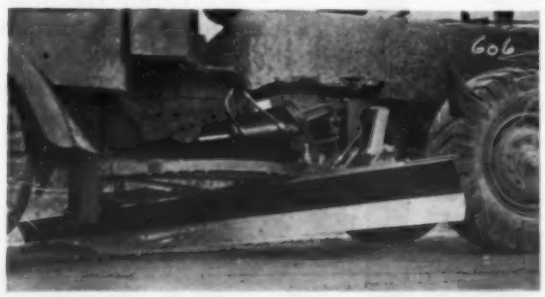
MADSEN IRON WORKS, 5631 Bicket St., Huntington Park, Calif.

Safety First . . *Remove Ice Hazards*

THE NEW WILLETT HYDRAULIC TRUCK-GRADER

Cuts, breaks up ruts and ice off streets and roads quickest, cheapest way with rotatable curved moldboard, cushioned or rigid operation, blade pitched forward for ice cutting when desired; all with full hydraulic power control of tilting, rotating, and reversing of curved moldboard from the truck cab.

IT CUTS! **IT GRADES!** **IT MAINTAINS!**



The above new "Willetts" on state highway trucks are doing a splendid job cutting and breaking up ice and general all year around maintenance. Many city and county highway departments are using "Willetts" with great success! Models for all makes of trucks, 1½ tons and up; standard lengths up to 14'; moldboards up to 17" wide; 10" to 15" clearance under lifted blade.

WRITE FOR LITERATURE, PRICES, ETC. ON NEW MODELS. PATENTED AND PATENTS APPLIED FOR.

Designed and built by
WILLETT MANUFACTURING COMPANY
GRAND RAPIDS, MICHIGAN

Canadian Manufacturer
CUSSON BROTHERS, LTD.
MONTREAL

Will It Work? . . . . . It Will If It's a Willett

These big I beams in the control house took the weight of the conduit liners for the service gates at Sepulveda Dam when they were being lowered into place.

Setting Control Gates In Flood-Control Dam

(*Continued from page* 30)

was lowered into place on the supports. Six inches from the I-beams the load was stopped by Rigger Meadows and a No. 13 piano wire was stretched across the two survey points and the punch marks. Then the load was lowered, and with the help of three men who steadied it, it was possible to set the gates to within 1/16 inch of line both ways. The final adjustment to line and grade was made by pushing the corners with 50-ton hydraulic jacks while a transit was set up on each center line of the gate. Steel shims were used between the gate liner and the I-beam support to bring the whole assembly to grade. The gates were set to no tolerance. When completed, they were exactly "on the money".

As soon as the liners were in place the shims were welded by an electric arc to form a solid unit with the gate and the steel supports. Jack bolts were placed between the gate liners and the concrete walls of the gate blockout pits, and five spreaders made of 4 x 4 x ½-inch angle iron were placed between each liner to prevent any side movement when the concrete work was in progress later on. One-inch steel rods were welded from the conduit liner nuts to dowel steel sticking out of the concrete to prevent any "floating" action when concrete was placed around the gates.

Details of Work

Somewhat of a record was achieved by Rigger Meadows in assembling different parts of the gates. He brought the three conduit sections for one gate in and joined them together in an average time of two shifts per gate. That included handling them three times. He established somewhat of a safety record, too, in having but one minor accident which was typical of this kind of work. One of the boys reached in to line a hole up with his finger after Lee had given the signal to hoist away. Fortunately, only a quarter of an inch of his finger overlapped inside the two flanges. That is the part of his finger which is still missing.

The company used preformed wire rope throughout the whole assembly, both on the hoist line of the dragline and on the main drum of the electric traveling crane. Some of it was even used for slings. Jahn-Bressi-Bevanda has been a preformed user for several years, ever since it discovered that the preformed type of rope would stand wear and abrasion better, and above all, would not wicker and become razor-sharp in the hands of the men who handled it. It is worthy of note that while this heavy work was going on there were in excess of 50 puncture wounds reported on the whole dam, and not one of them was caused by wire rope!

The bonnet which housed the leaf in the up position and the service cylinder for each gate were all set in place by the electric crane in the control house, as was the cylinder cap and the automatic gate hanger. Each gate was set up fully and run through initial performance tests before any concrete was allowed to be poured around the metal.

The installation of these unusually large gates in the record time of five weeks aroused considerable favorable comment among engineering and contracting executives in the Los Angeles area. Colonel Edwin C. Kelton was in charge of the work for the U. S. Engineer Department, and V. Bressi superintended the field work for the contractor.

Regular cleaning, proper lubrication and periodic overhaul of equipment will keep it efficient.

Tractors and Tools For Stabilized Roads

The economies in equipping a soil-stabilization project with farm equipment have done much to stimulate the use of this method of base construction on county and town roads, as well as on many other types of projects, including airport runways. Oliver Farm Equipment Co., 400 West Madison St., Chicago, Ill., has a very complete line of farm equipment adaptable to this type of work, including the Oliver 70, 80, 90 and 99 farm tractors, which have met the test of heavy service in plowing operations and pulling all types of equipment.

In addition, Oliver tractor disk harrows, Models TGP and TGPX, developed especially for breaking up clods of clay and other hard soils on farms, are especially adapted to this same type of work in pulverizing soils used in all types of stabilization operations. The Oliver deep tillage cultivator, which has controlled digging depth and is equipped with bull tongue shovels, is excellent for turning over the mix after pulverizing to insure a thorough incorporation of the stabilizing agent with the soil to the full depth of the layer being stabilized.

Complete information on any of these products may be secured direct from Oliver by mentioning this item.

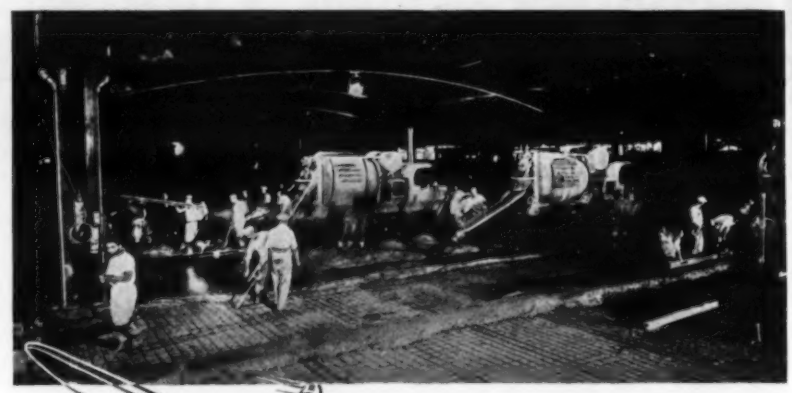
Do your part in the Defense Program. Buy Defense Stamps and Bonds.

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity

** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.



PLANE HORSEPOWER . . . OR PLAIN HORSEPOWER

YOU CAN'T HAVE THE ONE WITHOUT THE OTHER

AGAIN Waukesha Power is speeding defense construction. This time it's at East Hartford, Connecticut—helping to build Pratt & Whitney's new plant, which will soon be producing the engines to power speedy pursuit planes and powerful big bombers for our Army Air Corps.

As usual Waukesha is right on the job—25-35 hp. XAHU Waukesha Engines driving the Chain Belt Moto-Mixers that are turning out the concrete for the factory floors.

Whether it's building new factory facilities to supply new weapons of defense . . . or building the roads over which they will be transported . . . or the trucks which will move them . . . Waukesha Engines play an inconspicuous but vitally important part. For it's Waukeshas that supply much of the horsepower for construction and road-building contractors' machinery of all types—and the motive power for trucks and busses.

Waukesha Gasoline and Oil Engines for Industrial, Stationary and Automotive Power range in size from 5 hp. to over 300 hp.

Bulletin 1079 is a complete catalog of every Waukesha Engine and Power Unit with ratings, speed torque, horsepower and size. Send for it today.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK TULSA LOS ANGELES

MORE POWER FOR DEFENSE

WAUKESHA ENGINES

MAKE YOUR Mall VIBRATOR 8 TIMES AS USEFUL

SANDING
RUBBING AND GRINDING
DRILLING
OTHER ATTACHMENTS FOR CHAIN AND CIRCULAR SAWING WIRE BRUSHING CONE SANDING AND DRUM SANDING
PUMPING

With These Interchangeable Attachments

We Make Over 200 Gasoline Engine Air and Electrically Operated Portable Power Tools and Attachments

Many every-day jobs that eat up profits when done by hand methods can be handled faster, better and cheaper with YOUR MALL Vibrator. Pumping, Form Sanding, Wet Wall Rubbing, Grinding, Drilling, Sawing, Wire Brushing, Sharpening Tools and Bits and other tasks are a set-up for this multiple duty unit. Each of the light-weight, swivel-fitted tools for these applications can be changed in a jiffy to save time between jobs and all operated efficiently by any MALL Gasoline, Pneumatic or Electrically powered Vibrator.

Why let YOUR MALL Vibrator stand idle between concrete placing jobs, when you can easily keep it busy and save at every turn with these quickly interchangeable attachments? We'll gladly show you how. Write TODAY for our latest catalog and ask for a FREE Demonstration.

MALL TOOL COMPANY
7743 SOUTH CHICAGO AVE. CHICAGO, ILL.
Offices and Distributors in Principal Cities

Typical Bridge Work On Nebraska Highway

(*Continued from page* 1)

Hartington and Coleridge, Nebraska, at a total cost of $77,789.95. The contracts were divided into: grading, 380,910 cubic yards done by Theisen Bros. of Osmond, Nebraska, for $37,647.80; culverts, including the two largest, a triple 8 x 3 x 39-foot concrete box and a twin 12 x 6 x 39-foot concrete box, done by Keim Construction Co. of Tecumseh, Nebraska, for $9,100.25; and seven bridges from 60 to 120 feet in length built by W. A. Biba Engineering Co. of Geneva, Nebraska, for a total of $51,041.90.

As the bridges are typical of Nebraska construction for structures of this size, we are describing the work on a 72-foot structure, near the Coleridge end of the contract, having a 27-foot center span flanked by two 22-foot 6-inch spans and with a 24-foot clear roadway. The bridge has five creosoted piles in each abutment with creosoted 3 x 12-inch backing lumber on the outside of the abutment piles. The two bents consist of 9 piles each, driven to an average 28-foot penetration with a 3,300-pound drop hammer handled by a dragline.

The 24-foot roadway has a crown of 2 3/16 inches and the deck is 13 inches thick throughout, with the crown built into the floor. The curb and rail support is 10 inches high for the curb, 13 inches wide with the curb face battered 1 inch, and then set back 4 inches, above which rises the 10-inch guard-rail support which is also battered 1 inch in 10 inches, and is 7 inches wide at the top. The top corners of the support and of the curb are chamfered ¾ inch. The caps on the abutments are 2 feet square and 28 feet long, and on the pile bents are 2 feet wide x 2 feet 6 inches deep x 26 feet 2 inches long.

Falsework

For falsework for the deck spans the contractor drove cottonwood piles to divide the spans in halves, using 8 x 8-inch caps on the falsework piles and 4 x 11-inch stringers on 18-inch centers with 1 x 6 form lumber. The individual stringers were raised to furnish the deck crown by means of wedges. It is interesting to note that the cottonwood piles were furnished to the contractor by a local farmer at $1.00 each, cut and delivered.

C. & E. M. Photo

Cottonwood piles at a dollar each were used for falsework and creosoted piles comprise the abutment and two bents of a 72-foot concrete-deck and wood-pile-bent bridge on Nebraska Highway 15.

Concreting

For the concrete the contractor used a pit-run gravel which hit right in the middle of the specifications for screen size with a maximum size of less than 1-inch aggregate. The specifications allowed a maximum of dirt of 3 per cent but this pit-run gravel ran under 2.7 per cent at all times. The aggregates were stockpiled at one end of the bridge and then shoveled into wheelbarrows by three men who weighed the one aggregate on Fairbanks wheelbarrow scales. The aggregate was mixed a minimum of one minute in a Jaeger 2-bag mixer, and then dumped into concrete carts which were pulled up a ramp to the bridge deck by a truck backing away from the structure and pulling the cart by rope. Water for the mixer was furnished from the stream of a 2-inch Jaeger Sure-Prime pump delivering the water to a circular stock tank from which the mixer pump took suction.

The concrete was dumped directly into the forms, with two men shoveling it to place and another vibrating it in place with a Viber mechanical vibrator. For pouring, the bridge structure was divided into five slabs which were poured in the following sequence: the north end slab, then the center slab and then the south end slab followed by the north intermediate slab and finally the south intermediate slab.

All of the forms were lined with ¼-inch plywood with 1 x 12-inch form-lumber backing and using 2 x 4 studs on 16-inch centers and 2 x 4 sills, top and bottom. A 2 x 4 was placed against the inside of the outer curb form to space the heavy reinforcing steel at the proper distance from the surface of the concrete. As soon as the concrete had reached the elevation of the 2 x 4 it was removed. A minimum period of 48 hours was required between the pouring of the two end and middle slabs and the pouring of the two intermediate slabs.

Quantities

The small bridge described above involved the following quantities of materials in its construction:

Excavation, bridge	20 cubic yards
Treated bridge timber	1.990 MBM
Class AA concrete	85.5 cubic yards
Class A concrete	17.9 cubic yards
Reinforcing steel	23,900 pounds
Treated timber piling	1,124 feet
Structural steel for handrail	2,690 pounds

The bid price on this particular structure was $4,104.50. The contractor was W. A. Biba Engineering Co. of Geneva, Nebraska, for whom Vincent Kozial was Superintendent. J. M. Calder, Jr., was Project Engineer for the Nebraska Department of Roads and Irrigation.

A. E. D. Meeting

The Twenty-Third Annual Convention of the Associated Equipment Distributors will be held on Monday, Tuesday, and Wednesday, January 12-14, 1942, at the Edgewater Beach Hotel in Chicago. In addition, the A.E.D. is sponsoring "Distributor's Week" in conjunction with the meeting.

Why Let Excess Weight Rob Your Dragline of its Digging Power?

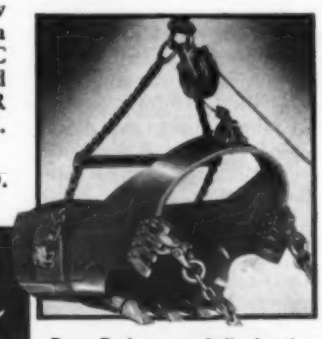
Don't fool yourself that slapping some more iron on the lip, or arch, or back of your old, worn-out bucket will make it "good as new".

PATCHES CUT PRODUCTION! Every extra pound you weld onto the bucket means sacrificing that much "pay load". What's more, this "excess baggage" destroys the BALANCE of your bucket and reduces its digging ability.

BOOST YOUR PRODUCTION . . . Get the MOST out of your dragline . . . Get INCREASED PROFITS . . . Get a Page AUTOMATIC Bucket.

Fill in the coupon below for full details about a Page AUTOMATIC Bucket in the size and weight suited to YOUR job. DO IT NOW. MAIL TODAY!

PAGE ENGINEERING CO.
Chicago, Illinois



PAGE *Automatic* DRAGLINE BUCKETS

Page Buckets are built in sizes from ⅜ to 15 cubic yards capacity, and in three weight groups . . . a bucket for every job.

Address this Coupon to: Dept. A-31, Page Engineering Company, c/o Clearing Post Office, Chicago, Ill.
Without obligating me in any way, mail a copy of your new descriptive bulletin titled "Your Dragline CAN Move Dirt Faster."

*Name*_____ *City*_____

*Street*_____ *State*_____

MORE TONS PER HOUR

MORE ACCURATELY ROLLED BY

3-AXLE TANDEMS

THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

Top, a welder using a Hobart arc welding unit joins sections of an 8-inch pipe line. Bottom, the long pipe being moved into position.

New Pipe Line Laid To Florida Army Post

The construction of a 14,750-foot pipe line extending from Tampa, Fla., westward to Drew Field and paralleling heavily-traveled Columbus Drive for most of the distance was accomplished with speed and very little interruption to the heavy flow of traffic on the Drive.

Lengths of 45-foot 8-inch steel pipe were unloaded on to the pavement and welded together, using Hobart arc welders, to form one long continuous pipe. This was moved by workmen onto temporary wood supports lying across the ditch to proper position, the supports removed, and the pipe lowered into the ditch. It is reported that the pipe was extremely flexible and welds of unusual strength permitted bending and handling the pipe. Several thousand additional feet of distribution pipe were laid within the Army post.

Engine Control Sets For Varied Services

The installation of a gasoline engine at a remote point makes necessary some device which will start it when it is needed and not require the personal attention of an inspector or laborer sent out for that specific purpose. Synchro-Start Products, Inc., 221 East Cullerton St., Chicago, Ill., in its Model 1436 Series control sets, provides just this type of operation for diesel, battery, magneto and dual ignition engines. These control sets are mounted in steel cabinets 8 x 13 x 3 inches, providing knock-outs for conduit wiring, and they contain all of the required switches, relays, time delays and time elements necessary for the complete control of the engine as well as a time delay element for starting the engine on zero oil pressure. There is a safety switch to prevent starting by remote control while the engine is being serviced. Indicating signal lights are installed to inform service men what caused the engine to shut down in case of engine failure. A terminal bar is provided for making all wire connections to the ignition, signals, automatic chokes, diesel throttle solenoids, fuel valves, alarms, overspeed governors, oil levels, pressures, temperatures, and any number of additional remote control switches.

This Synchro-Start Model 1436, when installed on an engine, will automatically close the starting motor circuit from any remote source of control such as a manual switch, temperatures, pressures, levels, loads, or power failure. It intermittently cranks the engine with off and on periods of cranking, until the engine starts or reaches the time limit allowed for cranking. It instantly breaks the starting motor circuit when the engine fires. A certain limited time is allowed for cranking the engine to get it started, thus saving the battery and the starting motor from damage. This control set also automatically connects and disconnects the circuits to ignition, fuel valves, chokes, magneto, throttle solenoids, etc., and automatically shuts down the engine and cuts off the battery and ignition in case of an abnormal operating condition, such as failure to start, failure of the fuel supply, failure of ignition, failure of oil pressure or overloading of the cooling system.

Full information regarding the adaptability of this control set to isolated pumping problems, power problems, electric lighting circuits and other features will be furnished promptly by Synchro-Start Products, Inc., to those writing and mentioning this item.

New Paving Breaker

A new 60-pound cushioned-air paving breaker, known as the CC-60, has recently been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. This tool is designed for hard clay, shale, brick, concrete or for jobs where it is not feasible to use a heavier tool. It is also suitable for plant maintenance work.

The CC-60 is 27 inches in length overall, has a ¾-inch inlet and hose, takes 1⅛-inch steel, and weighs 63 pounds. It is reported that this tool is easily handled because of an air cushion which absorbs the blow of the piston when the steel is not in contact with the work. Consequently there is less fatigue for the operator and less breakage of parts, the manufacturer states.

A new booklet, Form 2768, giving further details on this new CC-60 paving breaker may be secured direct from the manufacturer by mentioning this item.

New Allocation of Duties At Caterpillar Tractor Co.

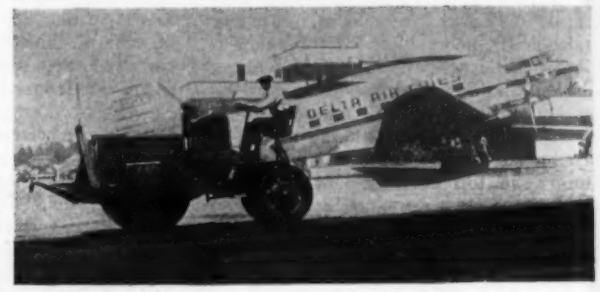
Following the election of Louis B. Neumiller as President of the Caterpillar Tractor Co., a new allocation of duties has been announced.

T. J. Connor, Vice President, has been assigned the general supervision of the Industrial Relations Department and Training and Public Relations Department in addition to the departments of manufacturing, engineering and purchasing which he had previously administered. T. R. Farley, Vice President, has been assigned direction of the Parts and Service Departments, which duties he will handle in addition to the Merchandise Department. General supervision of the Traffic Department, formerly conducted by Mr. Farley, has been given over to William Blackie.

Galion No. 101 motor grader on a road widening job in California. This big grader has full revolving circle to permit any blade adjustment—diesel or gasoline engine—all-gear driven double drive—centralized finger-tip controls and other important features to provide low-cost operation.

GALION • GALION • GALION • GALION • GALION

Galion everywhere . . . working on access roads to airports, camps, navy yards and defense plants . . . and on new road construction and maintenance. Motor graders, road rollers, spreaders and pull graders . . . built right to do the job right and at the lowest possible cost to you.



Galion portable roller (right) compacting black-top on runways in airport construction. Weight variable from 7800 to 10,000 lbs.—easily portable by attaching to truck. 4-cylinder gasoline engine.

GALION ROAD MACHINERY

THE GALION IRON WORKS & MFG. CO.

GALION OHIO

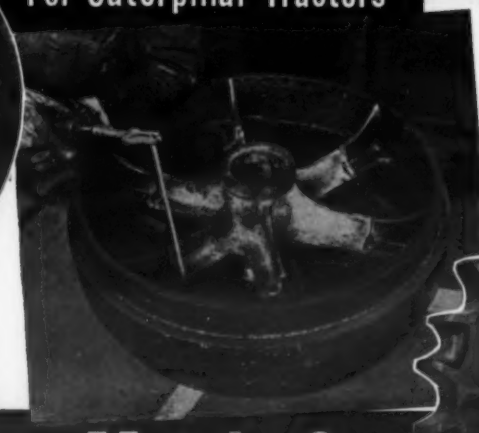
Motor graders—three models
Rollers—3-wheel, tandem, portable, trench and sheepsfoot
Spreaders—chips, mulch, asphalt, crushed stone, slag
Pull graders—four sizes—manual or hydraulic control

America's Finest
Waterproofed Tarpaulins

YOUR GUARANTEE GENUINE PARA PURE PARAFFIN BASE WATERPROOF TREATMENT

DISTRIBUTORS EVERYWHERE
Manufactured by
H. Wenzel Tent & Duck Co.
St. Louis, Mo.

DURABLE MANGANESE STEEL *Renewable* TRACTOR RIMS
For Caterpillar Tractors



When only the rims of those tractor drive sprockets and idlers have worn down, you'll save by welding on manganese steel renewable rims . . . They cost much less than the complete part and they're specially adapted for resisting destructive abrasive wear.

They Last Longer
They Cost Less

Alloy Steel & Metals Co.

Telephone LAfayette 0181
1862 E. 55TH ST. LOS ANGELES, CALIF.

Manufacturers of PACIFIC CRUSHING & SCREENING UNITS • PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • Alloy-Manganese CRUSHER JAWS & MILL LINERS • PACIFIC ROCK BIT GRINDERS HAND WINCHES • CRAWLER SHOES, SPROCKET RIMS and Other Machinery Wearing Parts

Contract System Must Be Preserved

(*Continued from page 4*)

cedure such as: 1) to prepare and adopt complete plans and specifications; 2) to evaluate an estimate of the cost of the work to be undertaken; 3) to encourage, by public advertising, and to permit by invitation, keen competition from bidders; 4) to demand the submission by bidders of a proposal guarantee; 5) to award the contract to the lowest responsible bidder; 6) to exact from the successful contractor a surety bond guaranteeing completion within the contract cost and within a specified time, as well as a guarantee as to the quality of the materials and goods to be utilized; 7) by strict supervision of competent agencies, to insure that the work is done according to the plans and specifications.

Even with the foregoing procedure, misapplication and unsound practices have prevailed, until agencies representing all interests have gradually evolved specification provisions to meet practically any contingency in any type of work. Now, all of this was done for one purpose only, and that was to protect the owner-interest, whether it be private or public.

Whenever public officials depart from the time-proved safety-measured established procedure of competitive contract construction, public officials are trying to put something over on the public. They are trying to escape some safeguard which the public has generally found necessary to adopt in public statutes. If public officials were not trying to put something over, they would stick behind the safe and sure method.

My great concern over the present socialistic trend which we recognize in construction is that when it is finally exposed and the public reacts, some contractors may be involved. The man who has earned the reputation and established himself as a qualified responsible contractor possesses a considerable degree of shrewdness. Knowing the pitfalls as well as the safeguards, he is in a pretty good position to take advantage of the public official who departs from the tried and proved. Such is to be expected in the negotiated contract; such is to be expected in the inadequacies of day-labor construction; such is to be expected in the equipment rentals now prevailing; and such can always be expected when the experienced contractor deals with a vacillating public official. A sound public official will not hazard the reputation gamble which is involved in day labor or force account operations.

If we of the construction industry value our place in the American economy, we will stick for the competitive contract method for it is honest, it is complete, and it is surrounded by safeguards to protect the contractor, the employees, and those whose services and products are utilized as well as the architect, the engineer, and the awarding official.

Very truly yours,
James B. Kenney, Managing Director,
Colorado Assn. of Highway Contractors

The new Gar-Bro welding-tank cart.

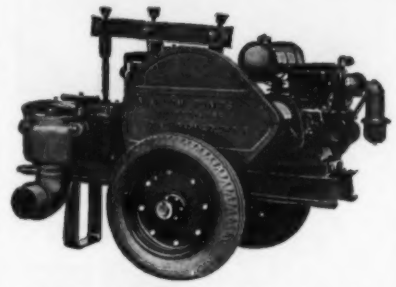
Narrow-Width Cart For Acetylene Tanks

The feature of the new Gar-Bro Welding-tank cart, just announced by Garlinghouse Bros., 2416 East 16th St., Los Angeles, Calif., is its unusually narrow width of only 24 inches, enabling it to pass through any door or passage as well as through narrow aisles in crowded shops or garages. This narrow width is made possible by placing one tank behind the others, instead of side by side.

The chassis is mounted on two large pneumatic-tired wheels with fully depressed hubs and 30 x 3½-inch heavy-duty tires, so that the carts may be wheeled over rough uneven ground or used in the field. Either tank may be removed independently of the other, as the acetylene cylinder is inserted at the front and the oxygen tank is placed in the rear. The cart frame is rigidly constructed of all-welded steel tubing. A broad heavy bottom plate rests flush with the floor when the cart is standing still, to assure steady support. A large steel tool box and two rod holders, for long and short rods, are conveniently attached to each cart.

Further information on this new Gar-Bro tank cart, Item No. 730-N, may be secured by interested contractors and state and county highway engineers direct from the manufacturer by referring to this item.

4" Single Mud Hog Pump on Pneumatic Wheels



The "Old Reliable" Mud Hog brought up to date.

Gearing enclosed—running in oil.

All cut gearing.

Die-forged crankshaft in pump.

Available in the ball valve Force type, or the flat valve Open Discharge.

Send for Bulletin No. CEM-40-D.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY

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for GREATER STRENGTH and SPEED

. . . writes a veteran crane operator who has been swinging buckets for 10 years. There's a reason! Williams sheave assembly, with sheaves set askew (see illustration), keeps leads straight, reducing friction and fraying. Cable lasts longer. Sheave block is protected against contact with bucket load; open ends guard against clogging and abrasive wear. Williams special Welded Rolled Steel Construction also increases strength and improves balance of bucket. A Williams insures faster work, cleaner dumping, more yardage, and operates for years practically free of costs for maintenance and repairs.

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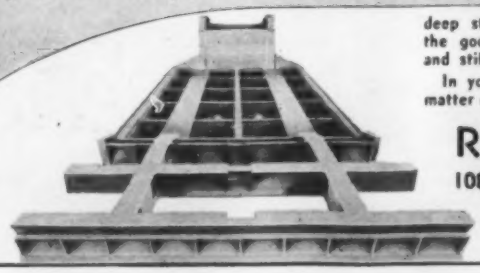
THE WELLMAN ENGINEERING COMPANY
7012 Central Avenue Cleveland, Ohio

WILLIAMS *Buckets*
***built by* WELLMAN**

You Get EXTRA
"BACKBONE" *in a*
ROGERS TRAILER



ROGERS TRAILERS have uncommon basic strength and an extra liberal factor of safety—yet they pack no excess weight.

Scientific design based upon long experience, alloy steel and electric welding produce trailers that have an envious record for long service with remarkable freedom from repairs.

The uniform design of all standard trailers incorporates two deep structural main members or "backbones" which extend from the rear to the gooseneck. These liberally proportioned members are further strengthened and stiffened as each additional piece is attached.

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108 ORCHARD ST. ALBION PENNA.

EXPERIENCE *builds'em* PERFORMANCE *sells'em*

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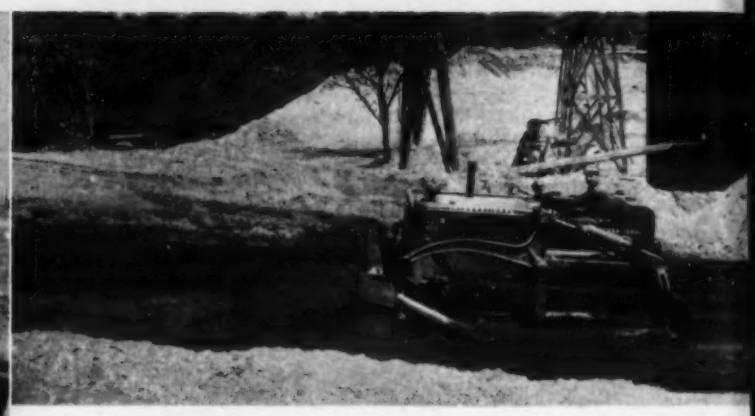
Contractors and Engineers Monthly

Another method of attacking the snowdrift problem. The State Highway Commission of Kansas creates a temporary snow fence by plowing deep snow into ridges in fields adjoining the highway. Other phases of snow removal and ice control in Kansas are described on page 16.

C. & E. M. Photo

That's all right, Old Man,—we are just getting your picture. After the loaded buggy h been hauled up to the bridge deck by a shuttling truck, one or two men maneuvered it deliver the concrete on the Biba bridge contract in Nebraska. See page 1.



C. & E. M. Photos

Scenes at the Boston Sand & Gravel Co.'s aggregate production plant at East Greenwich, R. I., set up to furnish sand and crushed gravel for the new Naval Air Station at Quonset, R. I. At left, a general view of the Telsmith plant; middle, the pit of the Fairbanks platform scales was pumped out twice a day by a Jaeger Sure-Prime pump; right, back and forth over the ever-growing pile of washed sand this International TD-14 tractor and B-E bulldozer pushed the wet sand uphill to feed the Link-Belt Speeder shovel which loaded the sand trucks. This plant regularly produced 250 tons of aggregates an hour and during the winter of 1940-41, produced 4,000 tons per 20-hour day in temperatures as low as 16 degrees F. See page 13.

Below, loading a MultiFoote 34-E paver onto an equipment trailer for a quick shift to another section of the work on the Paterson, N.J., by-pass, for which LaFera-Grecco Contracting Co. was the contractor. In the circle, the outfit en route. Note the man on top of the paver, watching the electric wires. See page 29.

C. & E. M. Photos

In preparation for heavy holiday traffic last summer, 45 in Michigan receives an application of calcium ride. See page 21.

C. & E. M.

In a borrow pit for one of Canada's defense highways which is also impo to this country, an Austin-Western elevating grader with RD8 tractor load dressing for Ontario Route 2. See page 7.

C. & E. M. Photo